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13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.					
14. ABSTRACT The International Network for Social Network Analysis (INSNA) is a professional association that hosts an international conference nicknamed "Sunbelt" every year. In 2016 the meeting was convened in Newport Beach, California on April 5th – 10th, hosted by Kayla de la Haye and Thomas W. Valente, faculty in the Keck School of Medicine, University of Southern California, and co-organized by Rebecca Davis, Harold Green at RAND Corporation, and Kathryn Coronges at Northeastern University. This report summarizes the conference activities and allocation of the ARO Conference Grant.					
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RPPR Final Report
as of 13-Oct-2022

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Final Report for Period Beginning 12-Feb-2016 and Ending 11-Feb-2017

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Report Term: 0-Other

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Accomplishments: The 2016 Sunbelt conference was a 6-day event. It started with 33 workshops held over 2 days (with 642 workshop attendees), which were led by experts in social network methods and analysis (SNA) and applied fields. The remaining 4-day program included a keynote presentation, reception and banquet, poster sessions, and parallel presentation sessions covering theory, methods, and diverse applications of SNA including the following topics: methodological advances in SNA; network visualization; data collection and data mining; networks and teams; diffusion of innovations; collective action; and network interventions. The Keynote presentation was delivered by the Simmel Award recipient, Professor Garry Robins who is Professor in the Melbourne School of Psychological Sciences at the University of Melbourne. Prof. Robins is the recipient of multiple research awards for his work in SNA, which has led to important developments in statistical models for social networks (i.e., exponential random graph models) and the application of social network analysis in diverse applied fields.

Training Opportunities:

Results Dissemination:

Honors and Awards:

Protocol Activity Status:

Technology Transfer:

RPPR Final Report
as of 13-Oct-2022

Partners

,

I certify that the information in the report is complete and accurate:

Signature:

Signature Date:

W911NF-16-1-0066
ARO 68719-NS-CF de la Haye

**International Network for Social Network Analysis
'Sunbelt' Conference**

FINAL REPORT

Army Research Office Conference Grant, Network Sciences Division

Prepared by:
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September 11 2016

1. Conference Objectives

The International Network for Social Network Analysis (INSNA) is a professional association that hosts an international conference nicknamed “Sunbelt” every year. In 2016 the meeting was convened in Newport Beach, California on April 5th – 10th, hosted by Kayla de la Haye and Thomas W. Valente, faculty in the Keck School of Medicine, University of Southern California, and co-organized by Rebecca Davis, Harold Green at RAND Corporation, and Kathryn Coronges at Northeastern University.

INSNA is a professional association for researchers and practitioners interested in social network analysis. The association is a non-profit organization incorporated in 1977, and it currently has over 1,000 international members. One of the principal functions of INSNA is to assist in sponsoring the annual International Social Networks Conference (known as “Sunbelt”). The **Sunbelt** conference is held annually in locations around the world (often in North America or Europe), with 800 to 1000 attendees typically registering for the conference each year. The **conference’s objective** is to provide an interdisciplinary venue for social scientists, mathematicians, computer scientists, statisticians, ethnologists, epidemiologists, organizational theorists, and others to present current work in the area of social networks. The international conference is a highly valued meeting place for networking, learning, and advancing ideas in the field of SNA.

The 2016 Sunbelt conference was a 6-day event. It started with 33 workshops held over 2 days (with 642 workshop attendees), which were led by experts in social network methods and analysis (SNA) and applied fields. The remaining 4-day program included a keynote presentation, reception and banquet, poster sessions, and parallel presentation sessions covering theory, methods, and diverse applications of SNA including the following topics: methodological advances in SNA; network visualization; data collection and data mining; networks and teams; diffusion of innovations; collective action; and network interventions. The Keynote presentation was delivered by the Simmel Award recipient, Professor Garry Robins who is Professor in the Melbourne School of Psychological Sciences at the University of Melbourne. Prof. Robins is the recipient of multiple research awards for his work in SNA, which has led to important developments in statistical models for social networks (i.e., exponential random graph models) and the application of social network analysis in diverse applied fields.

2. ARO Conference Grant Budget Allocation

Funding received from the ARO Conference Grant supported the following Sunbelt conference activities:

<i>Travel and accommodation for the Keynote Prof. Garry Robins:</i> including hotel accommodation for the 6 day conference, return flight from Melbourne to Los Angeles, and local travel costs (taxis to/from the airport to conference venue).	\$4,498.00
<i>Poster Symposium & Poster Slam event and reception (Friday evening):</i> including room set-up fees, poster boards and supplies, and a hors d’oeuvres reception served during the event, which hosted approximately 80 posters, 12 poster slammers, and 300+ attendees.	\$5,030.00
<i>Conference Website Development:</i> development of the 2016 conference website www.insna.org/sunbelt2016 by a webdeveloper.	\$4,758.00

3. Conference Program

The following documents are included as attachments in this report:

- 1) Conference Program: 2016 Sunbelt Program_FINAL.pdf
- 2) Conference Full List of Abstracts: 2016 Sunbelt Abstracts_FINAL.pdf

4. Conference Attendees

The conference was attended by 748 attendees, with 642 registrations for conference workshops. We received 760 abstract submissions, and 557 papers and 62 posters were presented as part of the final program.

The names and affiliations of attendees who registered for the conference can be found in the attached "Sunbelt2016-Final Registration.xls".

5. Conference Website

The conference website can be found at this link: www.insna.org/sunbelt2016 and a summary of the website can be found in the attached "Sunbelt 2016_Website screen shots.pdf".

International Sunbelt Social Network Conference

**Newport Beach Marriott Hotel & Spa
Newport Beach, CA
April 5 to April 10, 2016**



2016 Conference Organizers
Kayla de la Haye, University of Southern California
Rebecca Davis
Thomas W. Valente, University of Southern California
Hank Green, RAND Corporation
Kate Coronges, Northeastern University

Final Program

Conference Sponsors



Generous Grant Support



The Team

Special Thanks

George Vega Yon, University of Southern California
Heesung Shin, University of Southern California
Jayne Gordon, RAND Corporation
Marilyn Atchue-Zuill, Hospitality Performance Network Global

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Luella Fu	Heesung Shin	Sheila Yu
Taylor Harris	Anu Sidhu	
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Kendra Geeraerts	Peter Mendel	Min Ju Yoo
Alexandra Gerbasi	Tanya Menon	Lindsay Young
	Chloé Meredith	Paola Zappa

Dear Colleague,

Welcome to Sunbelt XXXVI International Social Network Conference in Newport Beach, California!

Your registration package consists of this printed program, a name tag, and tickets for the banquet and/or workshops if you registered for them. Full abstracts are available on the conference website: www.insna.org/sunbelt2016/program/

Please review this program as it contains some last-minute changes. Any further changes will be posted as necessary at the registration desk.

There are some "Sunbelt" traditions that we would like to highlight:

- Oral presentations are to start and stop at **the stated program times**, as attendees often move between sessions to catch papers of interest.
- The named session chairs are asked to keep the session presenters **on time**.
- If you are presenting a talk, please load your presentation slides on the dedicated laptop connected to the projector **10 minutes before the session starts**. If you need to use your own laptop this will cut into your 20-minute presentation time.
- Lunch breaks are over 1 hour to give you enough time to enjoy the Southern California coast, your colleagues, and other 'sunbelty' things.
- There is a hospitality suite Wednesday through Saturday evening, from 9pm to 12am, in the hotel Presidential Suite. We ask that you cooperate with our student assistants who will close the suite at 12am.

If you have any questions about the conference, please look out for the organizers or student assistants. We are happy to help.

Thank you for your attendance and contribution to this conference. We hope that you have an intellectually valuable, and very enjoyable week in Newport Beach!

The Organizers

Kayla de la Haye

Rebecca Davis

Tom Valente

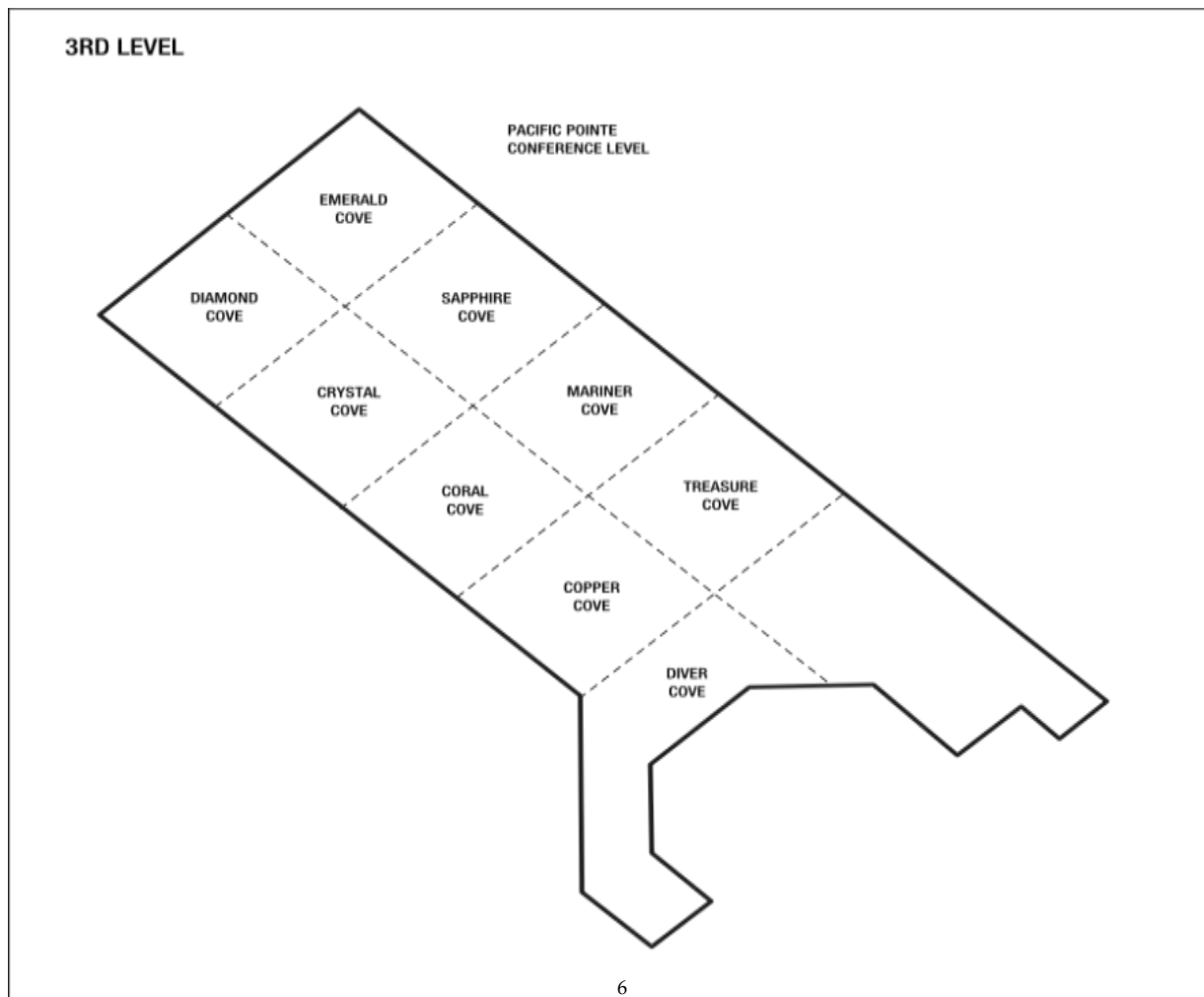
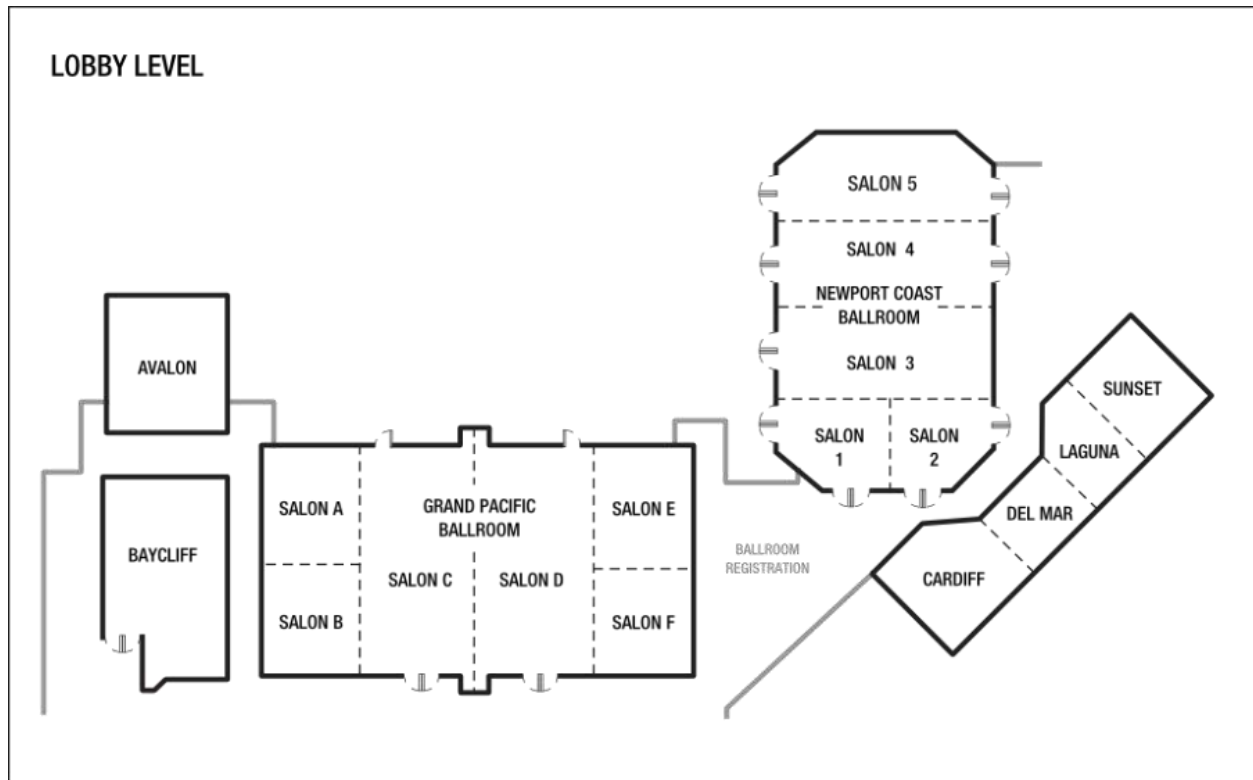
Hank Green

Kate Coronges



NEWPORT BEACH MARRIOTT HOTEL & SPA 900 Newport Center Drive, Newport Beach, CA 92660 949.640.4000

Meeting Space



Program Overview

DATE	AM	PM	EVENING
Tuesday April 5	Registration Workshops	Workshops	Workshops
Wednesday April 6	Registration Workshops	Parallel Paper Sessions	Hospitality
Thursday April 7	Registration Parallel Paper Sessions	Parallel Paper Sessions	Keynote Banquet Hospitality
Friday April 8	Registration Parallel Paper Sessions	INSNA Board Meeting Parallel Paper Sessions	Poster Symposium & Slam Hospitality
Saturday April 9	Registration Parallel Paper Sessions	INSNA Business Meeting Parallel Paper Sessions	Hospitality
Sunday April 10	Registration Parallel Paper Sessions	Close	–

Conference Registration will be open from 7:30am until 5:00pm, Tuesday through Saturday, in the Ballroom Registration

Breakfast will be served each morning from 7:00am until 8:00am in the Lounge, next to Sam & Harry's (Friday it will be in the Newport Coast Ballroom Foyer).

Coffee Breaks (morning and afternoon) will be held in the Newport Coast Ballroom Foyer.

Wifi. Attendees who are registered at the Newport Beach Marriott Hotel & Spa will receive wifi details upon check in at the hotel. Other conference attendees will receive wifi details upon checking in at the conference Registration Desk.

Workshops

Room	Tuesday 8:00am-11:00am	Tuesday 11:30am-2:30pm	Tuesday 3:00pm-6:00pm	Tuesday 6:30pm-9:30pm	Wednesday 8:00am-11:00am
Baycliff	Introduction to Social Network Analysis with R and statnet	Moving beyond Descriptives: Basic Network Statistics with statnet	Exponential Family Random Graph Modeling (ERGMs) Using statnet	Introduction to Egocentric Network Data Analysis with ERGMs and TERGMs Using statnet	Valued Network Modeling with statnet
Salons 1 & 2	Dynamic Network Analysis (DNA) and *ORA		Managing Dynamic Network Data in statnet: Animations, Data Structures and Temporal SNA	Advanced Social Network Analysis using UCINET and Netdraw	
Salon 3	EgoWeb 2.0: Flexible Social Network Data Collection Software	Introduction to Modeling Temporal (Dynamic) ERGMs Using statnet	Modeling Relational Event Dynamics with statnet	From Words to Networks: Text-based/ Semantic Network Analysis	
Salon 4	A Hands-on Introduction to Analyzing Social Networks with UCINET & Netdraw		Introduction to Ego-network Analysis with R		Social Network Approaches for Behavior Change
Salon 5	Introduction to Research Design with Social Networks		Analysing Network Dynamics and Peer Influence Processes with RSiena		MRQAP-regression Analyses: Cross-sectional, Multilevel and Longitudinal Models
Cardiff	Visualizing Social Networks. How to Create Meaningful and Compelling Network Drawings	Multilevel Modeling for Egocentric Network Analysis	BlauNet: An R Package to Construct Blau Spaces and Analyze the “Blau Statuses” of Social Entities and Individuals...	Algebraic Analysis of Multiple, Signed, and Affiliation Networks with ‘multiplex’	The Positional Approach to Network Analysis
Laguna & Sunset	Understanding Diffusion with netdiffuseR	Basic and Advanced Network Visualization with Gephi: Part 1	Basic and Advanced Network Visualization with R: Part 2	Simplifying Ego-centered Network Analysis in R with egonetR	
Sapphire Cove	Collecting and Analyzing Social Media Data Using SocialMediaLab	Mixed Methods Research in Social Networks			
Copper Cove	Using R and igraph for Social Network Analysis		Agent-Based Models in Social Network Analysis Using Netlogo		Introduction to Social Network Data Collection with an Emphasis on Social Survey Methods
	Tuesday 8:00am-11:00am	Tuesday 11:30am-2:30pm	Tuesday 3:00pm-6:00pm	Tuesday 6:30pm-9:30pm	Wednesday 8:00am-11:00am

Keynote Speaker

Simmel Award Recipient Garry Robins

COLLAPSE OF NETWORKED SOCIAL SYSTEMS: NETWORK DEPENDENCE, FATE, AND WAR

Thursday April 7th, 5:30PM
Newport Coast Ballroom



Melbourne School of Psychological Sciences, University of Melbourne, Australia

Garry originally received a BSc honors degree in mathematics before a first career in the Australian foreign service. He returned to academia through completion of a B.A. and PhD in mathematical psychology from the University of Melbourne. His PhD research won awards from the Psychometric Society and the American Psychological Association. After a period at Deakin University, in 1999 he took up a position at the School of Psychology, University of Melbourne. Garry's principal work in social networks has been methodological, focusing on the development of exponential random graph models, but he has also had many collaborations in applied network-based research: for instance, epidemiology, animal behavior, defense, organizational and environmental studies. He is a past winner of the Freeman Award from INSNA and of the i2 award for the most highly cited paper in INSNA-related journals. His most recent book, *Doing Social Network Research: Network-based Research Design for Social Scientists*, appeared in 2015.

Parallel Sessions

Wednesday – PM1

PM1 Chair	Salon 5	Salon 4	Salon 3	Salon 2
	Intra-Organizational Networks <i>Susan O'Shea</i>	Collaboration and Coordination <i>Naneh Apkarian</i>	Collecting Network Data: New Methods and Tools <i>Wendy Church</i>	Isolation and Risk: The Role of Social Networks <i>Thomas W. Valente</i>
13:40	Network Relationships and Job Changes of Software Developers <i>Dawn Foster, Guido Conaldi, Riccardo De Vita</i>		The Open Dynamic Interaction Network (ODIN) Framework For Collection and Modeling of Continuous Time Social and Behavioral Data <i>Kirk Dombrowski, Bilal Khan</i>	The Role of Gender, Strength of Ties, and Multiplexity On Syringe Sharing Among Young Persons Who Inject Drugs <i>Jasmine Smith, Basmattee Boodram</i>
14:00	Pizza Talk IV: Fighting Back Shitstorms With An Army of Superfans <i>Thomas Zorbach, Juergen Pfeffer</i>	Modeling Information Sharing Networks in Community Change Efforts <i>Jennifer Lawlor, Zachary Neal</i>	Social Network Analysis Through Perceptual Tomography (SNAPT) <i>Bilal Khan, Kirk Dombrowski</i>	An Investigation of Prison Inmate Network Structure <i>David Schaefer, Jacob Young, Derek Kreager, Martin Bouchard</i>
14:20	Teams and Ties: Workflow, Organisational Cultures and The Role of Workplace Design <i>Kerstin Sailer</i>	Relational Dynamics Between Emergency Management Organizations During A Terrorism Event <i>C. Ben Gibson, Carter T. Butts</i>	SPIDER: New Technology For Constructing Sociometric Networks From Personal Network Data <i>Christopher Hopkins, April Young</i>	Network Connections of Gang Members in A Homeless Youth Street Network and Related Risk Taking Behaviors <i>Robin Petering, Amanda Yoshioka-Maxwell, Jaih Craddock</i>
14:40	Merging Social Networks - Roles and Characteristics of Brokers in Corporate Acquisitions <i>Nicola Mirc, Philippe Very, Norbert Steigenberger, Mark Ebers</i>	Talking About Teaching: Social Networks of Instructors of Undergraduate Mathematics <i>Naneh Apkarian</i>	Mechanisms of Tie Formation in Activity-Based Online Social Networks <i>Emma Spiro, Zack Almqvist</i>	An International Perspective On Social Isolation and Community in Personal Networks <i>Vicente Espinoza, Matías Bargsted, Luis Maldonado</i>
15:00	Diffusion of Social Media Among International Nonprofit Organizations <i>Jieun Shin, Mina Park, Wenlin Liu</i>	The Beauty of Ivy: When Inequality Meets Equality <i>Julia Puaschunder</i>	The Sensorial Map of The City From Social-Networking Data <i>Daniele Quercia, Luca Maria Aiello, Rossano Schifanella</i>	Loneliness and Cortisol Associations With Friendship Network Dynamics <i>Olga Kornienko, David Schaefer, Thao Ha, Douglas Granger</i>
15:20	Through The Looking Glass: The Networks of FIFA Standing Committee Members <i>Susan O'Shea, Paul Widdop, Peter Millward</i>		Rightsizing Network Analysis For Social Impact Assessment: Matching Strategic Questions To Evaluation Practice <i>Wendy Church, Jane Reisman</i>	Effects of Externalizing Behavior, Internalizing Behavior On Friendship Networks Among Children <i>Heesung Shin, Jimi Huh, Thomas W. Valente</i>
15:40	Coffee Break, Newport Coast Ballroom Foyer			

Wednesday– PM1 cont.

PM1	Sunset	Laguna	Cardiff	Baycliff
	LGBTQ Networks and Health	Networks and Market Norms	Recent Advances in Statistical Analysis and Mathematical Modeling of Social Networks	Tie Dormancy and Reactivation
Chair	<i>Adam Jonas, Lindsay Young</i>	<i>Elise Penalva-Icher</i>	<i>Tai-Chi Wang</i>	<i>Alexandra Marin, Chang Z. Lin</i>
13:40	Changes in Sexual Network Characteristics of Young Men Who Have Sex With Men Over Time <i>Gregory Phillips II, Patrick Janulis, Brian Mustanski and Michelle Birkett</i>	Examining Yelp Business Network Using Homophily Theory <i>Yuehan Wang</i>	Committed Activists and The Reshaping of Status-Quo Social Consensus <i>Dina Mistry, Qian Zhang, Nicola Perra, Andrea Baronchelli</i>	The Pause that Refreshes: Biased Net Models for Renewing and Re-igniting Social Ties <i>John Skvoretz</i>
14:00	Individual And Network Predictors Of HIV And STI In Young Men Who Have Sex With Men <i>Michelle Birkett, Patrick Janulis, Gregory Phillips II and Brian Mustanski</i>	What Drives Food Truck Location Decisions? Social Contagion in Mobile Location Choice <i>Russ Nelson</i>	An Investigation Into Seasonal Influenza Vaccination Uptake in Foundation Doctors, Using Social Network Analysis and Spatial Modelling <i>Rhiannon Edge, Thomas Keegan, Peter Diggle, Rachel Isba</i>	Dissolution and Re-Activation in Collaboration Networks <i>Jimi Adams and Ryan Light</i>
14:20	Social Disorder and Network Dynamics among Young Black Men who Have Sex with Men <i>Britt Skaathun and John A. Schneider</i>	When Politics Make Markets, Regulation In France In The 1980's <i>Fabien Eloire</i>	Alternative Estimation Methods For Identifying Contagion Effects Using Longitudinal Social Network Data <i>Ran Xu</i>	Intra-organizational Tie Preservation and Dissolution During Crisis <i>Sean Fitzhugh and Arwen Decostanza</i>
14:40	Sexual Networks And Racial Disparities In HIV Among Men Who Have Sex With Men In Atlanta: A Dynamic Network Modeling Study <i>Steven Goodreau, Samuel Jenness, Eli Rosenberg and Patrick Sullivan</i>	Social Networks And Industrial Rules Definition During Trade Fairs <i>Guillaume Favre, Julien Brailly and Emmanuel Lazega</i>	Estimating Thresholds in Empirical Social Contagion <i>George Berry, Christopher Cameron</i>	Efficient Incremental Extraction of Social Groups from Real-World Social Network Data Sets <i>Larry Richard Carley and Kathleen Carley</i>
15:00	Changes in Drug Network Characteristics and Marijuana Use Among Young Men Who Have Sex With Men <i>Patrick Janulis, Gregory Phillips, Brian Mustanski and Michelle Birkett</i>	Getting in Position: Uncovering the Antecedents of Global Network Position <i>Rebeca Perren, Cinthia B. Saturnino, Willy Bolander, Christopher Plouffe</i>	Using Trusses To Detect Social Anomalies in Network Data <i>Christine Sowa, Janis Butkevics, Jonathan Cohen</i>	Episodic Relationships and HIV in Disease Networks <i>David Bell</i>
15:20		An Application of Input-Output Networks To Regional Economies <i>Tayo Fabusuyi and Juergen Pfeffer</i>	Corrected Overlap Weight and Clustering Coefficient <i>Vladimir Batagelj</i>	
15:40	Coffee Break, Newport Coast Ballroom Foyer			

Wednesday– PM2

PM2	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Bibliometrics and Co-Citation	Exponential Random Graph Models	Social Networks and Health: Risky Populations and Behaviors	Dynamics of Networks For Health Promotion	Inter-Organizational Networks: NGOs
Chair	<i>Marjan Cugmas</i>	<i>Alex Stivala</i>	<i>Edith Fox</i>	<i>Rachel Hogg</i>	<i>Sophia Fu</i>
16:00	Measuring Homophily in Scientific Collaboration Networks: A New Metric For Disconnected Networks <i>Bastien St-Louis Lalonde, David Campbell, Guillaume Roberge, Grégoire Côté, Rémi Lavoie and Éric Archambault</i>	Hamming Trajectory Sampling For Exponential Family Random Graph Models <i>Carter Butts</i>	Peer Influence On Injection Status: Social Proximity Vs. Geographic Proximity <i>Abby Rudolph, April Young and Jennifer Havens</i>	Evaluation of A Regional Network For The Inclusion of Persons With Impairments <i>Christiane Kellner</i>	International Refugee Crisis and The Evolution of INGO Network: From 2002 To 2016 <i>Aimei Yang and Rong Wang</i>
16:20	Different Operationalisations of The Stability of The Co-Authorship Blockmodels in Time <i>Marjan Cugmas, Anuška Ferligoj and Luka Kronegger</i>	Consistent Estimation of Multilevel Exponential-Family Random Graph Models <i>Michael Schweinberger</i>	Exploring Substance Use and Network Composition of Homeless Youth With and Without A History of Foster Care <i>Amanda Yoshioka-Maxwell and Eric Rice</i>	Measuring Organizational Network Capacity Among State-Level Nutrition Incentive Networks <i>Ligia Paina, Pamela Surkan, Anna Kharmats, Julia Pon and Leah Johnson</i>	Global Connectedness of Local LNGOs: A Remedy Or Poison For The Young Civil Society? <i>Adil Rodionov and Darkhan Medeuov</i>
16:40		The Effects The Number of Agents Has in The Formation of Networks and Statistical Analysis On Multiple Networks <i>Abel Camacho, Claudio Juan Tessone and René Algesheimer</i>	Missed Connections? Social Similarity and The Diffusion of Smoking Among Adolescents <i>Chan S. Suh, Yongren Shi and Matthew Brashears</i>	The Anatomy of Public Health Collaboratives: An Analysis of 500+ PARTNER Networks <i>Rachel Hogg</i>	The Evolution of Health International Nongovernmental Organization Networks <i>Matthew Pearce and Nolan Phillips</i>
17:00		Social Influence Models With Missing Data <i>Alex Stivala, Colin Gallagher, David Rolls, Peng Wang and Garry Robins</i>	How Teens Speakout: Formative Research For A Social Communication Intervention On Teen Contraceptive Use <i>Edith Fox, Whitney Wilson, Christine Dehlendorf</i>		Understanding The Size and Spread of Chinese NGO Networks: Capacity and Board Affiliations <i>Sophia Fu and Michelle Shumate</i>
17:20	Break				
21:00 to 24:00	Hospitality <i>Presidential Suite</i>				

Wednesday– PM2 cont.

PM2 Chair	Sunset	Laguna	Cardiff	Baycliff
	Learning and Knowledge Networks <i>Wanli Zhao</i>	Social Networks and Migration <i>Olga V. Mayorova</i>	Scientific Collaboration Networks <i>Lidiane Carvalho</i>	Networks and Teams <i>Yu Xu</i>
16:00	Study Conversation, Study Advice, and Goods Borrowing Networks in A Japanese University Class <i>Hideki Fujiyama</i>	Diffusion of Innovation in Family Size Preferences and Acceptability of Contraceptive Use Between Urban Migrants and Non-Migrants in Rural Senegal <i>John Sandberg, Laetitia Douillot, Valerie Delaunay and Yacine Boujija</i>	Exchange-Based Collaboration in Science: A Theoretical Model <i>Michał Bojanowski</i>	Solving Temporal Team Assignment Problems Using A Markov Decision Process Framework <i>Prithwish Basu, Aaron Schecter and Noshir Contractor</i>
16:20	The Role of Ethnicity and Social Networks in Academic Achievement and Drop-Out of High School Students <i>Zsafia Boda and Christoph Stadtfeld</i>	The Effect of Network Segregation On Wage Formation: The Case of The Sri Lankan Immigrant Community in Milan, Italy <i>Valerio Leone Scialobazza, Raffaele Vacca and Luca De Benedictis</i>	Multiplex Networks and Individual Outcomes in Large Scale Scientific Work <i>Andrew Yu, Ralph Heidl, John Hollenbeck and Michael Howe</i>	Structural Measures of Specialization in Teams <i>Gahyun Jeon, Leslie Dechurch and Noshir Contractor</i>
16:40	The Characters of Keywords Network Structure in The Field of SNA <i>Wanli Zhao, Guodong Zhang, Yiqun Li</i>	Migration and Ethnic Segregation: Evidence From Mobile Phone Logs <i>Ott Toomet and Joshua Blumenstock</i>	Field Formation in Intellectual Networks: The Emergence of The Life Sciences in Germany, 1770-1890 <i>Jacob Habinek</i>	The Formation of Intention To Contribution in Teamwork: Examining The Roles of Peer Assessment, Extrinsic Motivation, and Average Tie Strength With Teammates <i>Yu Xu and Yusi Liu</i>
17:00		Layers of Social Integration: Contact Opportunity and The Dynamics of Inter-Ethnic Friendships and Adolescents' Perceived Integration <i>Robert Hellpap, Isabel Raabe and Jan O. Jonsson</i>	Social Capital: Concepts and Measures Applied To The Study of Brazilian Scientist's Performance <i>Lidiane Carvalho and Regina Maria Marteleto</i>	
17:20	Break			
21:00 to 24:00	Hospitality <i>Presidential Suite</i>			

Thursday-AM1

	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
AM1	Collecting Network Data	Trade Networks	Intra-Organizational Networks	LGBTQ Networks and Health	Social Networks and Climate Change
Chair	Patrick Habecker	Olaf Rank	Jonathon Cummings	John Schneider	David Tindall
08:20	Integrating Approaches To Place, Time and Social Networks Using Agent-Based Modelling <i>Edmund Chattoe-Brown and Laurence Droy</i>			The Organization of Sexual Risk and Protection in A Digital Social Environment <i>Lindsay E. Young, Adam B. Jonas, Stuart Michaels and John A. Schneider</i>	Network Governance And The Low Carbon Transition – Governing Sustainable Energy Transition in The City of Birmingham, UK <i>Timea Nochta</i>
08:40	Surveying Networks in Comparative Perspective: A Social Capital Approach <i>Dominique Joye, Marlène Sapin and Christof Wolf</i>		Employee Cooperative Behaviors in Organizations: A Vignette Experiment <i>Nikki Van Gerwen, Vincent Buskens and Tanja van der Lippe</i>	A Social Network Comparison of African American MSM Who Frequently Use The Internet To Seek Sexual Partners With Those Who Seldom Or Never Use The Internet For Partner Selection <i>Carl Latkin and Karin Tobin</i>	Two-Mode Networks Testing Connectivity and Climate Response in Andean Peru <i>Philip Murphy</i>
09:00	An Emic View of Coupon Passing Decision Making and Reality in Respondent Driven Sampling <i>Jianghong Li, Alexei Zelenev, Heather Mosher, Margaret Weeks, Gayatri Moorith, Thomas Valente, Robert Heimer</i>		"Seeking To Learn" Versus "Seeking To Teach": Impacts On Timely Task Performance <i>Roopa Raman and Varun Grover</i>	Social Support Dynamics and Happiness of LGBT Adults <i>Mia Vogel and Bernd Wurpts</i>	Core-Periphery Dynamics in Thematic Subnetworks: A Case Study of Social Media Adoption By Outreach Professionals <i>Marco Bastos, Mark Lubell, and Carlo Piccardi</i>
09:20	An Inductive Typology of Egocentric Networks <i>Eric Giannella and Claude Fischer</i>	Trade Networks And Institutionalization Failure in Medieval Lübeck, 1311-1361 <i>Bernd Wurpts</i>	Network Approach For Managing Agile Organizations <i>Ian McCulloh</i>	Social Support and Risk Behavior Within The Sexual Networks of Black Gay Bisexual and Transgender Youth Attending Balls in The San Francisco Bay Area <i>Emily Arnold, Lance Pollack and Adam Jonas</i>	Social Networks, Adaptation, and Resilience in Mixed Cash-Subsistence Economies of Rural Alaska <i>Drew Gerkey</i>
09:40		International Trade of GMO Related Agricultural Products <i>Xanat Meza, Ke Jiang, George Barnett and Han Woo Park</i>	The Impact of Proximity and Hierarchy On Knowledge Recombination: A Field Experiment <i>Jonathon Cummings and Ramon Lecuona</i>	Membership in The House Ball and Gay Family Communities and Effects On HIV Protective Behaviors Among A Population Based Sample of Young Black Men Who Have Sex With Men <i>Adam Jonas, Lindsay Young, Stuart Michaels, Joel Jackson, Mario Pierce, John Schneider</i>	Does Sharing Support Inuit Food Security? New Insights From Food Sharing Networks. <i>Elsbeth Ready</i>
10:00	Understanding Social Network Size Variation Among Nebraskans Using The Network Scale-Up Method <i>Patrick Habecker, Bilal Khan and Kirk Dombrowski</i>	The Structural Patterns of International Trade: A Network-Based Approach <i>Olaf Rank and Clarissa Goertz</i>			Social Networks and Barriers To Innovation in Urban Water Infrastructure Planning <i>Lisa Scholten and Gunilla Öberg</i>
10:20	Coffee Break, Newport Coast Ballroom Foyer				

Thursday-AM1cont.

AM1	Sunset	Laguna	Cardiff	Baycliff
	Network Analysis in Educational Research	Networks and Market Norms	Social Media Networks	Recent Advances in Statistical Analysis and Mathematical Modeling of Social Networks
Chair	<i>Jennifer Watling Neal</i>	<i>Fabien Eloire</i>	<i>Juergen Pfeffer</i>	<i>Frederick Kin Hing Phoa</i>
08:20	Using Networks To Facilitate The Use of Research Evidence By Public School Administrators <i>Kristen Mills, Zachary Neal, Jennifer Neal, and Jennifer Lawlor</i>	Relationship Change in Social Networks: Analyzing Change in Support Provision Within Network Ties and Implications For Single Name Generator Longitudinal Studies <i>Alexandra Marin</i>		
08:40	On The Role of Informal Personal Networks in Explaining Technical Education Student Drop-Out <i>Carlos Contreras-Ibáñez</i>	“How much he earns? Really?” Relational Wages Comparison As A Stratification Social Process On Labor Market <i>Elise Penalva-Icher</i>		ClickDiary: Online Tracking of Health Behaviors and Mood <i>Tso-Jung Yen</i>
09:00	Students’ Popularity, Achievement and School Assessment <i>Vera Titkova, Valeria Ivaniushina and Daniel Alexandrov</i>	A Networked Anatomy of The CDO Bubble <i>Daniel Tischer and Adam Leaver</i>	Women2Women Belgium 2015: Using Social Media and Social Network Analysis To Empower Young Women in The Age of ISIS <i>Rusty Tunnard, Alysha Tierney and Katherine Trujillo</i>	Modeling Social Networks As Mediators <i>Tracy Sweet</i>
09:20	Effects of Teaching Practice On Classroom Friendship Networks <i>Maedeh Aboutalebi Karkavandi, Heidi Gazelle, Garry Robins and Vicki McKenzie</i>	The Micro-Relational Structure of Markets. Modelling Transaction Sequences in The EU Interbank Money Market <i>Federica Bianchi, Paola Zappa and Alessandro Lomi</i>	Consumer Ties in Social Media Networks <i>Duygu Akdevelioglu and Alladi Venkatesh</i>	Modeling The Coevolution of Event Networks and States With Application To Team Process <i>Aaron Schechter and Noshir Contractor</i>
09:40	Personality and Play: The Co-Evolution of Preschoolers’ Temperament Traits and Social Play Networks <i>Jennifer Watling Neal, C. Emily Durbin, Allison Gornik and Sharon Lo</i>	Collective Rationality in The Dynamics of Popularity <i>Peter Krafft, Julia Zheng, Wei Pan, Nicolas Della Penna, Yaniv Altshuler, Erez Shmueli, Josh Tenenbaum and Alex Pentland</i>	Emotion Homophily in Online Discussion Networks: A Networked Approach To Studying The Expressive Behaviors of Social Media Users in China <i>Yunya Song, Xinyu Dai and Jia Wang</i>	Non-Parametric Analysis of Bi-Dynamic Line-Graphs For Dynamic Network Data <i>Johan Koskinen, Chiara Broccatelli and Martin Everett</i>
10:00		Multiplexing and Changes in Borrowing, Favor Exchange, and Advice Networks in Response To The Availability of Formal Markets. <i>Abhijit Banerjee, Arun Chandrasekhar, Esther Duflo and Matthew Jackson</i>	Network Awareness: The Development and Validation of A Scale <i>Brooke Foucault Welles, Michael A. Stefanone and Christo Wilson</i>	The Ups and Downs of Network Churn: How Much is Too Much? <i>Wyatt Taylor and Meredith Woehler</i>
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Thursday – AM2

AM2	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Psychology and Mental Health	Network Centrality: Theoretical Advances and Applications	Regional and Community Networks For Healthcare Improvement	Social Support and Personal Networks	Academic and Co-Authorship Networks
Chair	Alexey Natekin	David Schoch	Peter Mendel	Joseph Cabrera	Suzanne Cadarette
10:40	Social Network Characteristics and Engagement With Mental Health Services Among Black-African and African-Caribbean People With Psychosis <i>Amy Degnan, Nick Crossley, Dawn Edge, Katherine Berry, and Kathryn Abel</i>	Biased-Net-Type Centrality Measure(S): Using A Probabilistic Version of Walks, Trails and Paths To Specify Central Actors in A Network <i>Filip Agneessens</i>	Community Engagement Interventions and Local Networks To Improve Health Services: Network Effects of The Community Partners in Care (CPIC) Cluster-Randomized Study <i>Peter Mendel, Jennifer O'Hara, Farbod Kadhoda and Lily Zhang</i>	Influence of Social Networks, Social Norms, and Cultural Beliefs On HIV Risk and Testing Behavior Among African American Women <i>Karla Wagner, Harold D. Green, Jr., and Jamila Stockman</i>	Network Analysis of Communications and Connections of Engineering Professional Skills Through Group Discussion <i>Mengxiao Zhu and Mo Zhang</i>
11:00	An Application of Social Network Analysis To The Comorbidity Study of DSM-IV Mental Disorders <i>Hanjoo Kim and Michelle Newman</i>	Evaluating Network Centrality Using Entropy Tools <i>Termeh Shafie and Ove Frank</i>	Health, Healthcare, and Community Networks: Applied Studies in Organizational SNA <i>Malcolm Williams, Ryan Brown and Danielle Varda</i>	Social Network Support and Healthcare Utilization, Access To Care, and Health Literacy Among Somali Refugees <i>Janet Okamoto, Farhia Omar, Scott Leischow and Mohamed Abukar</i>	What Brings Us Together: Institutions and Linking Behavior in Early Stage Academic Communities <i>Katharine Anderson, Matthew Crespi and Eleanor Sayre</i>
11:20	The Big Five Personality Traits in Network Formation <i>Brandon Sepulvado, David Hachen, Omar Lizardo and Matthew Chandler</i>	Navigating The Centrality Landscape of Networks Using Multi-Objective Optimization <i>Emőke-Ágnes Horvát and Kathrin Flaßkamp</i>	Creating A Network For Chronic Disease Management: The Atlantic Healthcare Quality Improvement Collaborative <i>Kaye Phillips, Thomas Valente, Keesa Elicksen, Jennifer Verma and Amar Claudia</i>	Calling On Kin: The Place of Parents and Adult Children in Egocentric Networks <i>Shira Offer and Claude Fischer</i>	Uptake of Methodological Innovation in Pharmacoepidemiology Follows The Diffusion of Innovations Model: Systematic Review and Co-Authorship Network Analysis <i>Suzanne Cadarette</i>
11:40	Social Influence Models in Community Setting: The Case of Post-Disaster Mental Health <i>H Colin Gallagher, Dean Lusher, Richard A Bryant, Peng Wang, Lisa Gibbs and Philippa Pattison</i>	Is It A Sign of Stability If Multiple Centrality Indices Agree? <i>David Schoch and Ulrik Brandes</i>	A Network Evaluation Framework For Community Networks Using The PARTNER Tool <i>Danielle Varda</i>	Personal Network Structure and Post-Disaster Recovery Experiences in Tornado-Affected Communities <i>Seungyoon Lee, Arif Sadri, Satish Ukkusuri, Rosalee Clawson, & Justin Seipel</i>	
12:00	Role of Structural Features of Egocentric Networks in Detection of Users From Groups About Suicide and Depression On Online Social Network V Kontakte.Com <i>Alexey Natekin, Aleksandr Semenov, Philipp Upravitelev, Maxim Kharchenko and Mikhail Trofimov</i>	Centrality Facing Inequality <i>Ulrik Brandes</i>	Analyzing Public Health Community Networks Using PARTNER To Assess Early Childhood Councils <i>Sara Sprong, Jessica Retrum and Danielle Varda</i>	Measuring Social Capital Using Network Structure <i>Joseph Cabrera and Alyssa Carroll</i>	
12:20	Break				

Thursday – AM2 cont.

AM2	Sunset	Laguna	Cardiff	Baycliff
	Networks For Learning	Socio-Semantic Networks	Sampling Methods / SNA Methods	Recent Advances in Statistical Analysis and Mathematical Modeling of Social Networks
Chair	<i>Chloé Meredith, Kendra Geeraerts</i>	<i>Jana Diesner</i>	<i>Patrick Doreian</i>	<i>Frederick Kin Hing Phoa</i>
10:40	The 'Strength' of Ties?: Investigating Teacher Burnout From A Social-Structural Perspective <i>Chloé Meredith, Sarah Gielen and Eva Kyndt</i>	Deliberative Methods, Social and Sociosemantic Networks and Opinion <i>François P. Robert, Pierre Mongeau and Johanne Saint-Charles</i>	A Network-Based Approach To Scoping Rumor Stories in Social Media <i>Logan Walls, Kate Starbird and Emma Spiro</i>	Network Exploration By Complements of Graphs With Graph Coloring <i>Frederick Kin Hing Phoa</i>
11:00	Age As A Predictor For Relationships Within Teacher Teams <i>Kendra Geeraerts, Jan Vanhoof, Piet Van Den Bossche and Nienke Moolenaar</i>	The Duality of Imposed and Emergent Meanings: A Socio-Semantic Network Analysis of Artistic Collectives <i>Nikita Basov and Alexandra Nenko</i>	Estimating The Proportion Depressed Among Lesbian, Gay, and Bisexual Older Adults: Lessons Learned From A Respondent-Driven Sampling Feasibility Case Study <i>Maryclare Griffin, Krista Gile, Karen Fredriksen-Goldsen, Mark Handcock and Elena Erosheva</i>	Focus Statistics For Testing Network Centrality On Uncorrelated Random Graphs <i>Tai-Chi Wang and Frederick Phoa</i>
11:20	Stick Together and Teach On: How Do The Characteristics of The Collegial Network Influence Newly Qualified Teachers' Social Informal Learning and in Turn Their Job Satisfaction? <i>Sanne De Vos, Johan De Wilde, Simon Beusaert and Chloé Meredith</i>	Hybrid Roles? A Socio-Semantic Network Analysis of Artists and Managers in Between Logics of Fields and Practices <i>Aleksandra Nenko, Anastasia Senicheva and Nikita Basov</i>	Positional Analysis of Multiple Networks With Actor Attributes <i>Antonio Rivero Ostoic</i>	Two-Stage Pseudo Maximum Likelihood Inference Combining Latent Space Models and Exponential Random Graph Models <i>Ming Cao, Kayo Fujimoto and Yong Chen</i>
11:40	Knowledge and Informal Network Structure of Teachers' Project Teams <i>Bieke Schreurs and Maarten De Laat</i>	Affection, Cognition and Power in Social and Sociosemantic Networks <i>Johanne Saint-Charles and Pierre Mongeau</i>	Actor Non-Response in Valued Social Networks: The Impact of Different Non-Response Treatments On The Stability of Blockmodels <i>Anuška Ferligoj, Anja Žnidaršič, and Patrick Doreian</i>	Exact Exploratory Blockmodeling of Multiple Relation, Mixed-Mode Networks <i>Matthew Dabkowski, Neng Fan and Ronald Breiger</i>
12:00	Exploring Change of Teachers' Social Networks Within Elementary Schools in Korea <i>Chong Min Kim</i>		Stability of Centrality Measures in Valued Networks Regarding Different Actor Non-Response Treatments and Macro-Network Structures <i>Patrick Doreian, Anja Žnidaršič and Anuška Ferligoj</i>	Network Change Detection and Prediction Using Time Series Methods <i>Janis Butkevics, Ian McCulloh and Christine Sowa</i>
12:20	Break			

Thursday – PM1

PM1	Salon 5	Salon 4	Salon 3
	Informant Accuracy	Egocentric Network Analysis: Theoretical and Methodological	Health Provider Networks and Practice Behavior
Chair	Emily Smith	Bernice Pescosolido	Joshua Mendelsohn
13:40	Comparing Accuracy and Respondent Burden of Approaches To Gathering Alter-Alter Tie Data in Egocentric Networks. <i>Kate Eddens and Jesse Fagan</i>	Simplifying Ego-Centric Network Analysis in R With EgonetR <i>Till Krenz and Andreas Herz</i>	Opioid and Benzodiazepine Prescribing Among Medicaid-Enrollees With Opioid Use Disorders: The Role of Provider Communities <i>Brad Stein, Joshua Mendelsohn, Adam Gordon, Andrew Dick, Rachel Burns, Mark Sorbero, Rosalie Pacula</i>
14:00	Mutual Assent Or Unilateral Nomination? A Performance Comparison of Intersection and Union Rules For Integrating Self-Reports of Social Relationships <i>Francis Lee and Carter T. Butts</i>	EgoWeb 2.0: Open-Source Software For Collecting and Analyzing Ego-Centric Network Data <i>David Kennedy</i>	An Investigation of Variation of Evidence-Based Implantable Cardioverter Defibrillator Treatment in The U.S. From A Network Science Perspective <i>Erika Moen, Andrea Austin, Julie Bynum, Jonathan Skinner, A. James O'Malley</i>
14:20	Accuracy of Egos' Report of Alters' Drug Use: Feasibility of Using Behavioral Data To Help Resolve Duplicates in Sociometric Risk Networks <i>April Young, Christopher Hopkins, Abby Rudolph and Jennifer Havens</i>	Empirical Dimensions of Social Capital. Testing For Inter-Group Measurement Equivalence of The Social Capital Instrument of The German National Educational Panel Study <i>Benjamin Schulz</i>	Advice-Seeking Among Colorectal Cancer Control Program Grantees, 2011-2012 <i>Miruna Petrescu-Prahova, Peggy Hannon, Annette Maxwell, Cam Escoffery, Thuy Vu, Marlana Kohn</i>
14:40	Interviewer Identity and Learning Effects As Sources of Variation in Self-Reported Reported Social Networks <i>Guy Harling, Francesc Xavier Gomez-Olive, Jessica Perkins, Katherine Morris, Collin Payne, Till Bärnighausen, Lisa Berkman</i>	Modeling The Dynamic of Networks With Heterogenous Social Capital Allocation <i>Enrico Ubaldi, Nicola Perra, Marton Karsai, Alessandro Vezzani, Raffaella Burioni, Alessandro Vespignani</i>	When Do Relations Between Organizations Serve Client Benefit? The Role of Enabling Network Structures <i>Denis Trapido and Francesca Pallotti</i>
15:00	The Accuracy Problem in Network Data Revisited <i>Steve Corman, Daniel Pressler and Daniel Bliss</i>	Using Non-Hierarchical Multilevel Models To Analyze Social Support in Overlapping Egocentric Networks <i>Raffaele Vacca, Jeanne-Marie Stacciarini and Mark Tranmer</i>	
15:20	Predicting Respondent Precision of Geographic Locations <i>Emily Smith, Carter Butts, John Hipp, Nicholas Nagle</i>	Estimating Contextual Effects From Sampled Ego Network Data <i>Jeffrey Smith</i>	
15:40	Coffee Break, Newport Coast Ballroom Foyer		

Thursday – PM1 cont.

PM1	Salon 2	Salon 1
	East Asian Social Networks	Social Network Science in the U.S. DoD
Chair	<i>Yanjie Bian</i>	<i>Kate Coronges</i>
13:40		Panel Members: Edward Palazzolo, Army Research Office Andy Slaughter, Army Research Institute Raluca Gera, Naval Post Graduate School John Roginski, Naval Post Graduate School Facilitator: Kate Coronges, Northeastern University
14:00	Bibliometric Traits of Social Network Analysis Field <i>Guodong Zhang, Wanli Zhao and Zhizhang Wang</i>	
14:20	Institutional Contingency of Network Embeddedness of Class Identification: Network Members' Occupational Status and Subjective Social Class in Three Societies <i>Lijun Song and Ruoh-Rong Yu</i>	
14:40	Network and Individual Factors Associated With Drug Use Among Female Sex Workers in China <i>Yeon Jung Yu, Christopher McCarty and Bo Wang</i>	
15:00	The Re-Birth of Sociology in China in The Early 1980s -A Network Analysis <i>Danching Ruan</i>	
15:20		
15:40	Coffee Break , Newport Coast Ballroom Foyer	

Thursday – PM1 cont.

PM1 Chair	Sunset	Laguna	Cardiff
	Networks in Global Health <i>Jessica Shearer</i>	Network Analysis in Educational Research <i>Kacy L Martin</i>	Networks in International Trade, Investment & Policy <i>Sara Gorgoni, Raja Kali</i>
13:40	Climate Change Alters Mating Strategies and Social Systems Among Rural African Pastoralists <i>Ashley Hazel and James Holland Jones</i>		Automotive International Trade Networks: A Comparative Analysis Over The Last Two Decades <i>Sara Gorgoni and Alessia Amighini</i>
14:00	Peer Learning Networks in Global Health: An Innovative Approach To Improve Primary Health Care in Africa <i>Emily Carnahan</i>	Teachers' Active Engagement in Social Media: A Comparison of Network Interactions Across Physical and Virtual Spaces <i>Zixi Chen, Kaitlin Torphy, Adrienne Hu, and Andy Jurasek</i>	Fragmentation of Production and The Competitiveness of Nations in The Automotive Sector - A Network Approach <i>Matthew Smith</i>
14:20	Social Network Analysis in Low-Resource Settings: Data Collection Do's and Don'ts <i>Anja Thompson</i>	Who Does Not Want To Sit Next To You in Class? Educational Performance and Social Rejection of Children of Immigrants in Europe <i>Isabel Raabe</i>	Assessing The Fragility of Global Trade - The Impact of Localized Supply Shocks Using Network Analysis <i>Magali Pinat, Yevgeniya Korniyenko and Brian Dew</i>
14:40	Evaluating Global Health Partnerships: A Case Study of The Gavi HPV Vaccine Application Process in Uganda <i>Carol Kamywa, Peter Waiswa, Gilbert Asimwe, Faith Namugaya, Emily Carnahan and Jessica Shearer</i>	Achievement Similarity Among Friends: Selection and Influence Processes <i>David Kretschmer</i>	Network Structure and Industrial Clustering Dynamics in The Aerospace Industry <i>Raja Kali, Ari Van Assche and Ekaterina Turkina</i>
15:00		Factors Influencing Parental Decisions: A Social Network Analysis of School Choice in Michigan <i>Kacy L Martin</i>	Rethinking Distance in International Trade: World Trade Atlas 1870-2013 <i>Guillermo García-Pérez, Marián Boguñá, Antoine Allard and M. Ángeles Serrano</i>
15:20	The Effects of Sexual Network Attributes On HIV Prevalence in Rural Uganda <i>Laura Bloomfield and Ronan Arthur</i>		Mapping Accountability Relationships Between Citizens and State Actors in The Water Sector in Rural Uganda: Insights From Social Network Analysis <i>Miet Kuppens</i>
15:40	Coffee Break, Newport Coast Ballroom Foyer		

Thursday – Evening Program

17:30 to 18:30	Keynote: Garry Robins <i>Collapse Of Networked Social Systems: Network Dependence, Fate, And War</i> Newport Coast Ballroom
19:00 to 20:00	Keynote Reception Rose Garden (If raining: Newport Coast Ballroom Foyer)
20:00 to 21:30	Banquet Seaview Terrace (If raining: Grand Pacific Ballroom)
21:00 to 24:00	Hospitality Presidential Suite

Friday – AM1

AM1 Chair	Salon 5	Salon 4	Salon 3	Salon 2
	Social Network Analysis of Mobile Phone Datasets <i>David Lazer, Geoffrey Canright, Kenth Engø-Monsen</i>	Microfoundations of Network Action <i>Tanya Menon, Mario Small, Ned Smith</i>	Dark Networks <i>Tracey Rizzuto</i>	Networks in International Trade, Investment & Policy <i>Sara Gorgoni, Raja Kali</i>
08:20	Making Sense of Big Data: Mobile Phone Communication Predicts Face-To-Face Interaction <i>Sam G. B. Roberts, Tobias Bornakke Jørgensen, Talayeh Aledavood and Jari Saramäki</i>		Partners in Crime? A Theory of Corruption As A Criminal Network: Evidence From A Lab Experiment <i>Romain Ferrali</i>	
08:40	Using Participants' Own Smartphones To Investigate The Role of Social Networks in Mental Health <i>Tjeerd Boonstra, Mark Larsen, Samuel Townsend and Helen Christensen</i>	The Enemy of My Friend Is Easy To Remember: Balance As A Compression Heuristic <i>Matthew Brashears and Laura Brashears</i>	Graph Theoretic Detection of Dark Networks in Background of Larger Social Networks <i>J.R. Lapides and Daniel Evans</i>	Networks of Trade and Foreign Direct Investment <i>Bruce Kogut and Jae-Suk Yang</i>
09:00	Interpersonal Network Dynamics in An Emerging Crisis <i>Carolina Mattsson, Drew Margolin and David Lazer</i>	The Co-Evolution of Networks and Personality <i>Meredith Woehler, Theresa Floyd, Wookje Sung, Jesse Fagan, Filip Agneessens, Travis Grosser and Giuseppe (Joe) Labianca</i>	Enhancing Community Detection in Multiplex Networks Leveraging Its Layers' Aggregation <i>Ralucca Gera, Ryan Miller and Akрати Saxena</i>	Bitcoin: The Network Structure of A Decentralized Financial Network <i>Ethan Fridmanski</i>
09:20	Inferring Urban Activity Distribution From Aggregated Egocentric Communication Data <i>Xuhong Zhang and Carter Butts</i>	Think Before You Network: Cognitive Flexibility, Agency, and Information Search <i>Bálint Diószegi, Daniella Laureiro-Martínez and Stefano Brusoni</i>	Business Policemen Behind The Blue Veil of Silence: Determinants of Centrality, Sentencing, and Whistleblowing in Elite Corrupt Networks <i>Ivan Aymaliev</i>	Network Influences On Country Policy Implementation <i>Thomas W. Valente, Stephanie Dyal, George Vega Yon, Kar-Hai Chu, Heather Wipfli and Kayo Fujimoto</i>
09:40	Strategies For Cleaning and Merging Social Network Data From Multiple Sources <i>Matthew Chandler</i>	Partner-Specific Behavior in Social Networks: Coordination Among Actors With Heterogeneous Preferences. <i>Vincent Buskens and Nikki Van Gerwen</i>	Conspiracies As Structure and Perception <i>Georg Rilingier</i>	
10:00	Ethnoracial Status and Tie Decay in Social Networks: Linking Triracial Hierarchy and Simmelian Tie Theory <i>David Hachen, Omar Lizardo, Michael Penta, Matthew Chandler and Brandon Sepulvado</i>	Intrinsic and Extrinsic Motivation As Antecedents For Employee's Embeddedness in Intra-Organizational Collaborative Networks <i>Natalie David and Olaf Rank</i>	Predicting The Emergence of Dark Criminal Leadership Through Social Networks and Social Media <i>Tracey Rizzuto</i>	
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Friday – AM1 cont.

	Sunset	Cardiff	Laguna	Baycliff
AM1	Networks of Cultural Organizations and Institutions	Networked Innovation	Network Approaches To Language, Meaning, and Sociocultural Contexts	Viszards Session
Chair	Gabriel Rossman and William Roy	Julien Brailly	David L Elliott	
08:20	Networks of Music Groups As Success Predictors Dmitry Zinoviev	How Social Networks Shape Absorptive Capacity in Open Innovation: Preliminary Results From Two Case Studies Andrew Terhorst		Juergen Pfeffer, Vladimir Batagelj, Katy Boerner, Ulrik Brandes, Seok-Hee Hong, Jeffrey Johnson, Lothar Krempel and Andrej Mrvar
08:40	How Music Genres Are Perceived and Reconstructed in The Consumer Market? Yongren Shi	Effectiveness of Policies For Innovation On A Local Level: A Comparative Study of Social Networks Paola Menapace	Dynamic Co-Evolutions of News Frames in International Peace Coverage: A Semantic Network Analysis Ke Jiang and George Barnett	
09:00	California Über Alles: Using Stochastic Actor-Oriented Models to Analyse Network Dynamics of Hardcore Punk in the USA 1979-1986 Joe Watson	The Emergence of Business Networks in An Emerging Biotechnology Sector: The Case of Taiwan Shihhsin Chen, Wei-Ting Lin and Duenkai Chen	Embodied Cognition Embedded in Semantic Feature Networks: A Multi-Language Analysis For Chinese, English, German and Italian Feng Lin, Weihua Xiang, Jing Gao, Zhongli Jiang and Baojia Li	
09:20	Repertoire Communities in American Popular Music 1895-1950 William Roy	Organisational Cultural Barriers To Innovation: A Social Network Perspective of The Commercialisation of Public Research Bopha Roden, Dean Lusher, Michael Gilding, Thomas Spurling, Greg Simpson, Ian Elsum, Julia Brennecke, Peng Wang, Vikki Bunton, Till Klein, Julien Brailly	Multi-Graph Based Semantic Knowledge Detection Giuseppe Giordano	
09:40	The Role of Showbusiness Families in Movie Industry: A Network Perspective Yasaman Gorji	Toward Small World Networks: The Trend of Dynamic Networks of Interlocked Elites in Taiwan Semiconductor Industry Ray-May Hsung and Gi-Yi Lin	The Context and Contents of Cyberbullying Anthony Paik and Marizen Ramirez	
10:00	Can Radio Stations Pick Singles? The Opinion Leadership Hypothesis Gabriel Rossman			
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Friday – AM2

AM2 Chair	Salon 5	Salon 4	Salon 3	Salon 2
	Adolescent Friendship Networks <i>Jaemin Lee</i>	Multilevel Network Perspectives in and Around Organizations <i>Spyros Angelopoulos, Francesca Pallotti</i>	Two-Mode Networks <i>Martin Everett</i>	Networks, Economics and The Labor Market <i>Scott Feld</i>
10:40		Bridging The Gender Divide: The Effect of Informal Status On The Structuring of Women and Men's Networks <i>Andrew Parker, Ajay Mehra, Peng Wang and Stephen Borgatti</i>	Knowledge and Experience in Two-Mode Temporal Networks <i>Martin Everett, Chiara Broccatelli and Johan Koskinen</i>	Indirect and Generalized Reciprocity Predict Networks of International Aid <i>David Melamed and Brent Simpson</i>
11:00	The Coevolution of Friendship, Companionship and Music Preference in Early Adolescence: A Social Network Study <i>Zeena Harakeh and Tom Snijders</i>	Multi-Scale Policy Networks For Regional Water Resources Governance <i>Jacob Hileman and Mark Lubell</i>	The Value of Affiliation: Dealing With Valued Two-Mode Networks <i>Zachary Neal</i>	Global Private Capital: A Network Perspective <i>William McCumber, Patrick Stanton</i>
11:20	Segregation in Social Networks: A Novel Approach Using Facebook <i>Bas Hofstra, Rense Corten, Frank Van Tubergen and Nicole Ellison</i>	Multilevel Socio-Material Network Analysis of Artistic Organizations: Combining Ethnographies and Exponential Random Graph Models <i>Anisya Khokhlova and Nikita Basov</i>	Online Dating Preferences: Two-Mode Versus One-Mode ERGM Network Analysis <i>Alina Lungeanu, Diane Felmlee and Derek Kreager</i>	Incentivizing Online Consumer Engagement For Public Health Messages <i>Helen Siuki and Cynthia Webster</i>
11:40	Influence and Selection in Adolescent Sexual Experiences: Modeling Differential Sexual Homophily By Same- and Cross-Gender Friendships <i>Jaemin Lee, Sarah Trinh, Carolyn Halpern and James Moody</i>	MMMM: Using Multiple Membership Multilevel Models To Analyze Networked Organizations <i>Guang Ying Mo and Barry Wellman</i>	When Knowledge and Experience Matter. Measuring Centrality in 2-Mode Temporal Covert Networks <i>Chiara Broccatelli, Richard De Mellow, Martin Everett and Johan Koskinen</i>	Social Capital, Islam, and Labor Force Outcomes: What Explains Labor Force Outcomes Among Muslim Immigrants? <i>Chang Z. Lin, Jeffery G. Reitz</i>
12:00				Explaining Participation in Open Organizations: The Role of Specialization and Repeated Collaboration <i>Marco Tonellato and Guido Conaldi</i>
12:20	Break			
12:00 to 13:30	INSNA Board of Directors Meeting Diamond Cove			

Friday – AM2 cont.

AM2 Chair	Salon 1	Sunset	Laguna	Cardiff	Baycliff
	Socio-Semantic Networks <i>Iina Hellsten</i>	Networks For Learning <i>Katerina Bohle Carbonell</i>	SNA in Russia: Progress and Prospects <i>Valentina Kuskova</i>	Social Networks and Health: Support <i>Laura Koehly</i>	Viszards Session
10:40	Socio-Semantic Analysis of Online Discussions On Public Transit Service <i>Moein Hosseini and Tamer El-Diraby</i>	What Predicts The Dissolution of Instructional Advice and Information Ties Between Teachers? <i>James P. Spillane and Matthew Shirrell</i>	Competitive Cultural Market: Collaborative Networks in Jazz and Metal <i>Stanislav Moiseev and Benjamin Lind</i>	Family Environment From A Network Perspective: Implications On Long Term Impacts of Genetics Services <i>Laura M. Koehly, Christopher S. Marcum, Sunmi Song and Donald W. Hadley</i>	<i>Juergen Pfeffer, Vladimir Batagelj, Katy Boerner, Ulrik Brandes, Seok-Hee Hong, Jeffrey Johnson, Lothar Krempel and Andrej Mrvar</i>
11:00	Socio-Semantic Configuration of A Twitter Territory <i>Camille Roth and Iina Hellsten</i>	The Evolution of The Personal Networks of Novice Librarian Researchers <i>Marie Kennedy, David Kennedy and Kristine Brancolini</i>	Political Attitudes Stability among Students: Social Network Approach <i>Yana Maria Priestley and George Beknazar-Yuzbashev</i>	Assessing The Degree of Partnering Between Informal and Formal Sectors <i>Robert Raeside and Tao Chen</i>	
11:20	Framing and Blaming: Socio-Semantics of The Eurocrisis <i>Adina Nerghes and Iina Hellsten</i>	Toward An Integrated Social Exchange Theory of Advice Relations in Organizations <i>Paola Zappa and Alessandro Lomi</i>	Subnetworks and Music Scenes: An Application of Generalized Two-Mode Cores <i>Benjamin Lind and Stanislav Moiseev</i>	Peer Leaders’ Demographic and Sociometric Characteristics Influence Alters’ Intervention Exposure in The Sources of Strength Suicide Prevention Program <i>Trevor Pickering, Thomas Valente and Peter Wyman</i>	
11:40	Networks of Meaning Or Meaning-Making in Networks? A Study of Socio-Semantic Change Among Young Scientists <i>Manjana Milkoreit</i>		The Co-Evolution of Work-Related Advice and Voice Networks <i>Ivan Kuznetsov</i>	Social Networks and Breast Cancer Prognosis in The Pathways Study <i>Candyce Kroenke, Marilyn Kwan, David Kennedy and Larry Kushi</i>	
12:00					
12:20	Break				
12:00 to 13:30	INSNA Board of Directors Meeting Diamond Cove				

Friday – PM1

PM1	Salon 5	Salon 4	Salon 3	Salon 2
	Changes in Social Networks and Resources Through The Life Course <i>Betina Hollstein</i>	Beyond Middle School: Further Results From The RAND Social Context of Adolescent Risk Behaviors Study <i>Harold D. Green, Jr.</i>	Online Networks <i>Amit Saha</i>	Social Networks and Climate Change <i>David Tindall</i>
13:40		Depression, Network, and Community Effects On Trajectories of Adolescent Marijuana and Alcohol Use <i>Michael Pollard</i>	N-Body: Search, Sort, and Filter Twitter Data Via A Planar Visualization To Handle Real-Time Data <i>Patrick Dudas</i>	Climate Change Policy Networks in The Czech Republic: Mapping Coalitions and Conflicts <i>Petr Ocelík</i>
14:00	Multiplexity in Personal Network of The Late Middle Age <i>Keunbok Lee</i>	Longitudinal Influences of Family, Individual and Community-Level Predictors On Alcohol Use in Middle and High School <i>Brett A Ewing, Jeremy NV Miles, Joan S Tucker, Dorothy L Espelage and Harold D. Green, Jr.</i>	Differential Use, Differential Meaning: Race and Community Structure On Twitter <i>Nina Cesare</i>	Multi-Level Challenges in Climate Change Policy Networks: Evidence From Indonesia <i>Monica Di Gregorio, Dodik Nurrochmat, Intan Sari and Sonya Kusuma Dewi</i>
14:20	Network Changes Over The Life-Course: Mechanisms and Driving Forces <i>Betina Hollstein</i>	Relationship Characteristics Associated With Sexualized Bullying Homophily: A Social Relations Model Perspective <i>Harold D. Green, Jr., Marc Punkay, Brett Ewing, Josh Embree, Dorothy Espelage and Joan Tucker</i>	Structural Signatures of Online Discussion Groups and Their Influence On Group Cohesion <i>Jacqueline Ng, Seyed Iravani and Noshir Contractor</i>	Combining Policy Network and Discourse Network Analysis To Understand Climate Change Advocacy Coalitions in Brazil <i>Leandra Fatorelli, Monica Di Gregorio and Peter May</i>
14:40	Pathways To Health And Wellbeing – The Social Networks of Orphaned And Abandoned Children <i>Lynne Messer, Kathryn Whetten, Anna Koons and Christine Gray</i>	Association of Community Norms With Willingness To Intervene in Bullying Among Early Adolescents <i>Benjamin Colaiaco, Harold D. Green, Jr., Dorothy Espelage, Brett Ewing, Kayla de la Haye, Michael Pollard and Joan Tucker</i>	Modeling Rumor Diffusion On Social Media During Crisis Events <i>Li Zeng, Kate Starbird and Emma S. Spiro</i>	Towards An Understanding of Citywide Urban Environmental Governance: An Examination of Stewardship Networks in Baltimore and Seattle <i>Michele Romolini, Morgan Grove, Curtis Ventriss, Christopher Koliba and Daniel Krymkowski</i>
15:00	Friendship Suspended: Estimating The Effects of School Suspension On Change in Friendship Selection <i>Wade Jacobsen</i>	Examining Bullying With A Longitudinal Social Network Analysis <i>Lisa De La Rue, Dorothy Espelage, Kayla de la Haye, Joan Tucker, Marc Punkay, and Harold D. Green, Jr.</i>	Community Peer Support For Autism in Social Media <i>Amit Saha and Nitin Agarwal</i>	
15:20	Network Analysis, Social Support, and Mental Health in College Students: An Examination of The Literature <i>Heather Clark, Rhonda Rahn, Meagan Shipley and Ledric Sherman</i>	Results From The RAND Social Context of Adolescent Risk Behaviors Study: Summarizing Key Findings <i>Joan Tucker</i>		
15:40	Coffee Break, Newport Coast Ballroom Foyer			

Friday – PM1 cont.

PM1	Sunset	Laguna	Cardiff	Baycliff
	Qualitative Social Network Research <i>Silvia Dominguez and Rosalyn Negrón</i>	Network Approaches To Language, Meaning, and Sociocultural Contexts <i>David L Elliott</i>	Words and Networks <i>Jana Diesner, Peter Gloor</i>	Social Media and Political Campaigns <i>Dimitrios Christopoulos</i>
13:40	Quantitative Social Network Analysis Through A Qualitative Lens; An Analysis of Subjectivity in Exploratory Analysis and Stochastic Models of Networks <i>Reza Yousefi-Nooraie, Maureen Dobbins, Alexandra Marin, Lynne Lohfeld and Robert Hanneman</i>	Authenticity and The Effects of Relational and Categorical Identities On Restaurants Reviews <i>Alessandro Lomi, Anastasia Giachanou, Fabio Crestani, and Spyros Angelopoulos</i>	Mental Models in A Knowledge Network <i>Michael Levy and Mark Lubell</i>	Online Political Media: Twitter Activity On The Run-Up To The Scottish Referendum <i>Dimitrios Christopoulos and Juergen Pfeffer</i>
14:00	Heterogeneous Personal Networks: Connecting Across Race and Class in Personal Relationships. <i>Silvia Dominguez and Juanita Barrera</i>	An Exploration of Textual Stancetaking By Major Bioethical Authors, 1971-1979 <i>David L Elliott</i>	Hopes and Fears: Institutional Logics and Discourse Sentiment Around MOOCs <i>Evgenia Dolgova, Pursey Heugens, Miriam Wolf and Krsto Pandza</i>	Gezi Park Protests Online: Networks For Collective Learning <i>Gunes Ertan</i>
14:20	Spread Global, Start Local: Modeling Endemic Socio-Spatial Influence Networks <i>Jeffrey Block</i>		The Ecology of Scientific Production: Modeling Competitive Dynamics Among Sociology Journals <i>Fedor Dokshin and Matthew Brashears</i>	The Emergence of Negative Campaigning On Twitter: Evolution of A Signed Network During The 2016 GOP Nomination Contest <i>Justin Gross</i>
14:40	Social Network Ethnography: Doing Qualitative Network Analysis in A Gang Neighborhood in Central Illinois <i>Mark Fleisher</i>	Metacommunicative Grammars in Sexual Encounters: Indexing HIV Status Across Migrant and Local Sexual Networks <i>Jorge Fontdevila</i>	Scientific Collaboration in Brazilian Health Informatics Scientific Community <i>Roberto Baptista, Gabriela Araujo, Fabio Teixeira and Ivan Pisa</i>	This Is #FreddieGray: Networks of Community Response To Injustice and Policing <i>Kimberly Glasgow</i>
15:00	The Meaning of A Close Tie: Social Network Name Generators and Conceptions of Closeness <i>Molly Copeland, Josh Bruce and Maria Cristina Ramos Flor</i>	The Fifteen Days: How A Protest Theme Emerges in Communication Networks? <i>Eunkyung Song</i>	Reinventing The Classics: Present Influences On Past Work <i>Valentin Danchev, Jacob Foster and James Evans</i>	Tackling User Bias in Social Media To Increase Prediction Validity of Political Opinions <i>Juergen Pfeffer and Fred Morstatter</i>
15:20		Local Action and The Pre-Relational State: Creating Uncertainty and Delay in Relational Decisions So As To Get The Upper Hand <i>Colin Peterson and Daniel McFarland</i>	Predicting Box Office From The Screenplay: The Role of Network Text Analysis <i>Starling Hunter and Susan Smith</i>	Ossalabs: Maximizing Social Media Value <i>Rick Grannis and Ricky Grannis-Vu</i>
15:40	Coffee Break, Newport Coast Ballroom Foyer			

Friday – PM2

PM2 Chair	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Corporate Networks <i>Eelke Heemskerk</i>	Communication Networks <i>Nicolás Bolívar</i>	Building Network Structure <i>Scott Feld</i>	Social Support <i>Jacob Young</i>	Doing Qualitative Network Analysis <i>Stefan Bernhard, Andreas Herz</i>
16:00	Corporate Elite Campaign Donations and Political Behavior: The Case of Proposed Labor Legislation <i>Anna Jacobs</i>	What Is A Relationship? -- Friendship As A Mutually Perceived and Enacted Type of Relational Story <i>Daniel McFarland and Jan Fuhse</i>	The Company We Keep: Experimental Evidence On Network Change From 56 Middle Schools <i>Hana Shepherd</i>	Coworking and Social Support Among Peers. A Multivariate ERGM of Economic and Social Exchange Between ICT Freelancers <i>Federico Bianchi, Niccolò Casnici and Flaminio Squazzoni</i>	Narrative Methods For The Analysis of Network Ties <i>Stefan Bernhard</i>
16:20	Business Unity and Corporate Responses To Social Movement Protest <i>Tarun Banerjee</i>	Changing Allegiance: Insider Threat and Inadvertent Leaks <i>Kathleen Carley, Geoffrey Morgan, Nikhil Behari, Neal Altman and Andrew Moore</i>	Using Organizational Social Capital To Increase Cancer Screenings For Medically Underserved Populations in New York State: A Practitioner Oriented Intervention <i>Jennie Law, Ellen Bradt and Dara Shapiro</i>	Bound To Help? Measuring Sense of Obligation in Strong Ties <i>Lindsay Bayham, Liana Prescott and Matthew Stimpson</i>	Figurational Approach To Network Dynamics: Analyzing Qualitatively The Evolvement of Marital Networks <i>Anna-Maija Castren</i>
16:40	The US Business Roundtable, Large Corporations and Congressional Lobbying <i>Bruce Cronin</i>	Which Authors of ICANN Documentary Information Disclosure Policy Requests Are Likely To Receive Defined Conditions of Non-Disclosure in ICANN's Response? <i>Sarah Clayton</i>	How Friends-of-Friends Referrals Cause Network Inequality: Evidence From A Field Experiment <i>Mathijs De Vaan and Dan Wang</i>	Sources and Changes in Social Support As Athletes Recover From Serious Sports Injuries: Retrospective Study <i>Ruth Lowry, Carl Bescoby and Melissa Day</i>	Towards Typologisation in Qualitative Network Analysis <i>Alice Altissimo and Andreas Herz</i>
17:00	Political Contributions Pre and Post Citizens United <i>Roy Barnes</i>	Metrics For Measuring Nodes' Power in Multi-Layer Networks <i>Nicolás Bolívar and Rafael M. Gutiérrez</i>	Eco-Network Extensivity and Community Attachment Among Recent Refugees in Albuquerque <i>Brian Soller, Jessica Goodkind and Christopher Browning</i>	Trust in Prison: An Exponential Random Graph Analysis of Binary and Weighted Networks <i>Jacob Young, David Schaefer and Derek Kreager</i>	The Story Behind The Network Graph: A Mixed-Method Study On Problem-Centered Interviews About The Impact of Social Relations On Career Paths <i>Marina Hennig and Cathleen Stützer</i>
17:20	Break				
17:30 to 19:30	Poster Symposium & Slam <i>Poster Symposium and Reception 17:30 to 19:30, Poster Slam 17:30-18:30</i> Grand Pacific Ballroom				
21:00 to 24:00	Hospitality Presidential Suite				

Friday – PM2 cont.

PM2 Chair	Sunset	Laguna	Cardiff	Baycliff
	Networks For Learning <i>Katerina Bohle Carbonell</i>	Social Networks and Health Inequalities <i>Andreas Klaerner</i>	Teaching Network Science to University Undergraduates <i>Alexandra Marin and Kate Coronges</i>	Exponential Random Graph Models <i>Ick Hoon Jin</i>
16:00	Teaching and Learning About Networks: A Metacognitive Dilemma <i>Stephen Uzzo, Catherine Cramer, Lori Sheetz and Hiroki Sayama</i>	Spatial Capital: Applications For The Study of Urban Inequality <i>Joseph Galaskiewicz, Kathryn Freeman Anderson and Kendra Thompson-Dyck</i>	Panel Members <i>Zachary Neal:</i> Small World Experiments in Undergraduate Courses <i>Jordi Comas:</i> Teaching Networks To Non-Experts in A General Education Class <i>Brooke Foucault Welles:</i> SNA As A Pathway To STEM: Broadening Participation in STEM Through Undergraduate SNA Classes <i>Catherine Cramer:</i> Teaching Social Network Analysis To Undergraduates	Estimation of Exponential-Family Random Graph Mixed Models With Dyadic Dependence <i>Pavel N. Krivitsky</i>
16:20	To Share Or Not To Share? A Social Network Application of Transactive Memory Theory To Examine Knowledge Sharing and Hiding in Organizational Work Teams <i>Chunke Su and Kami Vinton</i>	Integrating Ethnographic Perspectives and Personal Network Data in The Study of Vicarious Racism and Hypertension Among African Americans <i>Dalila D'Ingeo, Clarence Gravlee and Raffaele Vacca</i>		Combined Analysis of Social Structure and Individual Outcomes Using ERGMs <i>Peng Wang, Dean Lusher, Johan Koskinen and Garry Robins</i>
16:40	Similarity Breeds/Feeds Connection, Diversity Spices It: Exploring The Structure of Advice Networks in A Community of Practice/Knowledge Network <i>Drimitrina Dimitrova and Emmanuel Koku</i>	Using Network Analysis To Evaluate Leadership Development: The LAAMPP Institute <i>Linda Bosma, Raffaele Vacca, Jaime Martinez, Raymond Boyle and Rod Lew</i>		Modeling Measurement Error in Ties and Attributes Using ERGMs <i>Andrew Slaughter and Janie Yu</i>
17:00	Knowledge System Regarding Social Learning Amongst Stingless Beekeepers in Veracruz, Mexico <i>Rae Simms, Luciana Porter-Bolland and Alfonso Langle-Flores</i>	Social Networks, Stigma and Community Influences On HIV Testing and Disclosure <i>Emmanuel Koku</i>		Bayesian Analysis For Exponential Random Graph Models Using The Adaptive Exchange Sampler <i>Ick Hoon Jin, Ying Yuan and Faming Liang</i>
17:20	Break			
17:30 to 19:30	Poster Symposium & Slam <i>Poster Symposium and Reception 17:30 to 19:30, Poster Slam 17:30-18:30</i> Grand Pacific Ballroom			
21:00 to 24:00	Hospitality Presidential Suite			

Saturday – AM1

AM1 Chair	Salon 5	Salon 4	Salon 3	Salon 2
	Social Networks and Health <i>Kayo Fujimoto</i>	Modeling Network Dynamics <i>Lucia Falzon</i>	Negative Ties and Signed Graphs <i>Joe Labianca</i>	Inter-Organizational Networks <i>Alessandro Iorio</i>
08:20	Network-Based Modeling For HCV in US Drug Injectors: Treatment As Prevention <i>Alexei Zelenev, Jianghong Li and Frederick Altice</i>		Choosing A Beta Attenuation Value For The Political Independence Index <i>Joe Labianca, Jesse Fagan, Carlo J Labianca</i>	
08:40	Agent-Based Geosocial Visual Analytics For Epidemic Control <i>Wei Luo</i>	Estimating Demand Variability Due To Social Network Influence: Hidden Costs of A Connect World <i>Mozart B.C. Menezes, Giovanni J.C. Da Silveira and Renato Guimarães</i>	Playing With Signed Preschool Play Preference Graphs <i>Jeffrey Johnson, Patrick Doreian</i>	Unlikely Affiliations: Donor-Based Connections Between Congressional Senators Elected, 2012 <i>Christiana Robbins</i>
09:00	Empirically Calibrated Simulation Experiment of Non-Medical Vaccine Exemptions and Disease Outbreak Potential in California <i>Kayuet Liu</i>	Simultaneous and Temporal Autoregressive Network Models <i>Daniel Sewell</i>	Avoidance in Negative Ties: Inhibiting Closure, Reciprocity, and Homophily. <i>Nicholas Harrigan and Janice Yap</i>	The Citation Impacts of Structural Holes and Status in Patent Inventors' Networks: Three Taiwan Semiconductor Firms <i>Yi-Ren Guan and Ray-May Hsung</i>
09:20	Using Artificial Intelligence Techniques To Design Peer Led Interventions <i>Amulya Yadav, Leandro Soriano Marcolino, Eric Rice, Robin Petering and Milind Tambe</i>	A Dynamic Model For Networks of Bilateral Coordination <i>Christoph Stadtfeld, James Hollway and Per Block</i>	The Balance Theory of Sentiment Relations: An Elaboration and Test <i>Craig Rawlings and Noah Friedkin</i>	Using Web 2.0 To Support Collaboration in The Occupational Context - Analysing The Use Phase <i>Daniel Kammerl, Julian Wilberg and Udo Lindemann</i>
09:40	Integrating Theories of Health Behavior, Social Networks, and Systems Science <i>Kayla de la Haye and Jennifer Labrecque</i>	How Do Social Networks Change? A Conceptual Framework <i>Guillermo Ruiz and Eric Quintane</i>	Patterns of Votes On The Rehnquist Supreme Court <i>Patrick Doreian, Jeffrey Johnson and Stephen Borgatti</i>	Developing Infrastructure Networks in Support of Humanitarian Assistance Missions <i>Valentine Dike and Daniel Evans</i>
10:00	Multiplex Networks Among Organizations Catering To Young MSM: Competition, Collaboration, and Funding Relations <i>Kayo Fujimoto, Peng Wang, Lisa Kuhns, Michael Ross, Mark Williams, Robert Garofalo, Alden Klovdahla, Edward Lauman, John Schneider</i>	Exploring Temporal Network Measures and Social Connectivity in Online Interactions <i>Lucia Falzon</i>	Negative Ties: An Integrative Framework of Antecedents and Consequences, Meta-Analytic Investigation, and Agenda For The Future <i>Hamed Ghahremani and Prasad Balkundi</i>	Divide and Rule: A Network Assessment of The Italian Anti-Interlocking Law <i>Alessandro Iorio and Juergen Pfeffer</i>
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Saturday – AM1 cont.

AM1	Sunset	Laguna	Cardiff	Coral Cove	Copper Cove
Chair	Corporate Networks <i>Roy Barnes</i>	Social Networks and Health: Youth <i>Stephanie Dyal</i>	Interventions Using Network Structure <i>Scott Feld</i>	Collective Action and Social Movements <i>David Tindall</i>	Organizational and Technological Networks <i>Markku Jokisaari</i>
08:20		Friendship Selection Patterns Among Low-Income Minority Girls/Adolescents: Links To Obesity Risk <i>Kimberly Burdette, Amy Bohnert, Lara Dugas and David Shoham</i>		Risk On The Margin: The Structure of Covert Social Networks <i>Byungkyu Lee, Peter Bearman, Eun Shin</i>	Marketing Ecologies and Hashtag Structure in Commons Based Ecommerce Sites <i>Emily Sidnam</i>
08:40		Social Integration in Friendship Networks and Adolescent Smoking: The Role of Ties Outside of School <i>Cynthia Lakon, Rupa Jose, John Hipp, Cheng Wang and Carter Butts</i>	The "Majority Illusion" in Social Networks <i>Kristina Lerman, Xiaoran Ya, Xin-Zeng Wu</i>	Multiplex Networks of Civic Organizations in Cape Town, South Africa <i>Lorien Jasny, Henrik Ernstson and Mario Diani</i>	From Social Network To Social Network: Social Pricing Model For Emerging Markets Telecoms Customers <i>Olubayo Adekanmbi</i>
09:00	Social Entrenchment: Social Network Cohesion and Board Responsiveness To Shareholder Activism, 1998-2013 <i>Richard Benton</i>	Friendship Networks and Adolescent Health-Risk and Health-Protective Behavior <i>Emily Long, Ginger Lockhart</i>	Personal Network Structures in Activity-Based Online Social Networks <i>Zack Almquist and Emma Spiro</i>	Solidarity Or Schism: Ideological Congruence and The Egyptian Activists' Twitter Networks <i>Deena Abul Fottouh</i>	Longitudinal Analysis of Collaboration Graphs of Forked Open Source Software Development Projects Using An Actor-Oriented Social Network Analysis <i>Emerson Amirhosein Azarbakht</i>
09:20	Boosting Tech Innovation Ecosystems in Cities, A Framework For Growth and Sustainability of Urban Tech Innovation Ecosystems <i>Nga Nguyen, Victor Mulas</i>	Heterogeneity in Peer Selection Effects of Physical Activity in Youth <i>Teague Henry, Sabina Gesell and Edward Ip</i>	Can Influential Students Be Effective in Achieving Behavior Change Through Their Social Networks: Evidence and Challenges From Two UK Intervention Trials <i>Laurence Moore, Jo Holliday, Sharon Simpson</i>	When Sports Meet Politics: Exploring The Role of Sports Figures in Mizzou Political Action <i>Matthew Bui</i>	A Human Vulnerability Index For Interdependent Infrastructure Networks <i>Kelly Calder and Christopher McCarty</i>
09:40	Who Controls The Indian Economy: The Role of Families and Communities in The Structure and Evolution of The Indian Intercompany Network 2001, 2005 and 2009 <i>Dalhia Mani and Rodolphe Durand</i>	The Coevolution of Adolescent Friendship Networks, Loneliness, and Cigarette Smoking <i>Stephanie R. Dyal and Thomas W. Valente</i>	The Development of Strategic Interventions For Dark Networks and The Role of Daily Interactions On Network Structure <i>Daniel Cunningham, Sean Everton and Robert Schroeder</i>	How do Environmental Groups "Flock Together?": A Study of Homophily Effects on the Utah <i>Ye Sun, Kevin Deluca and Natasha Seegert</i>	Newcomers' Network-Based Resources After Organizational Entry <i>Markku Jokisaari</i>
10:00	Investigation of Operational Strategies and Organisational Structures of Multinational Private Water Companies <i>Yasaman Sarabi</i>		Counteracting the "Bad Apple": Disrupting Dark Organizational Networks to Enhance Performance and Commitment through the Strategic Use of Market Information <i>Cynthia B. Satornino, Mark Houston, Edward Bond</i>	Almost Random Connections? Proto-Networks Among Audiences and Firms During New Industry Emergence <i>Stephen J. Mezas and Florian Schloderer</i>	
10:20	Coffee Break, Newport Coast Ballroom Foyer				

Saturday – AM2

AM2	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Interventions Using Network Structure	Political Activity and Social Networks	Bibliometrics and Co-Citation	Centrality in Social Networks	Changes in Social Networks and Resources Through The Life Course
Chair	<i>Scott Feld</i>	<i>Julia Puaschunder</i>	<i>Elisa Bellotti</i>	<i>Jonathan Roginski</i>	<i>Anton Andersson</i>
10:40	Network Change Theory: Integrating Valente's and Watts' Models of Diffusion of Innovations <i>David Krackhardt</i>		Network and Actor Attribute Effects On Performance of Researchers in Two Fields of Social Science <i>Srebrenka Letina</i>	Centrality in The Global Network of Corporate Control <i>Frank Takes and Eelke Heemsker</i>	The Impact of Critical Labour Market Transitions On Social Networks <i>Sebastian Bähr</i>
11:00	Reducing Gunshot Victimization Through A Targeted Network Intervention <i>George Wood, Yanick Charette and Andrew V. Papachristos</i>	Women As Key Nodes Are Losing Trust, Reciprocity and Reputation in Mexican Authorities. Warming Signs For Public Policy On Food Production <i>Maria Guadalupe Gabriela Monsalvo-Velázquez</i>	Migration of Researchers To New Research Communities: The Use of Social Network Analysis To Tackle Integration in Structured Communities and The Ripple Effect On These Communities <i>Guillaume Roberge</i>	Longitudinal Network Analysis With Incomplete Data <i>Zachary Steinert-Threlkeld</i>	Socio-Technical Change and Social Networks: The Case of Women Workers in The Ready Made Garment Sector of Bangladesh <i>Kaberi Gayen and Robert Raeside</i>
11:20	Do Your Friends Really Have More Friends Than You Do? The Paradox of The Paradox of Friends <i>Vineet Kumar, David Krackhardt and Scott Feld</i>		Searching For Structures According To Scientific Reference Frames of Researchers <i>Luka Kronegger, Anuska Ferligoj and Franc Mali</i>	Does Status Really Matter? Contextualizing Social Influence On Yelp <i>Ignacio Cruz</i>	The Future of The Global Kinship Transition <i>Ashton Verdery and Hannah Furnas</i>
11:40	Further Considerations For Strategies of Using Friend of Friends For Reaching Large Numbers of Others <i>Scott Feld, Vineet Kumar and David Krackhardt</i>		The Evolution of Research Collaboration Within and Across Disciplines in Italian Academia. <i>Elisa Bellotti, Luka Kronegger and Luigi Guadalupi</i>	Who Is Adding Value To Your Personal and Professional Networks? <i>Jonathan Roginski</i>	"Friends And Supporters of Psychotherapy" Revisited: Interactions Between Lay and Professional Networks in Recovery From Mental Illness <i>Brea Perry, Erin Pullen and Bernice Pescosolido</i>
12:00	Social Network Targeting To Maximize Population Behavior Change: A Cluster Randomized Controlled Trial <i>David Kim, Alison Hwang, Derek Stafford, Alex Hughes, James O'Malley, James Fowler and Nicholas Christakis</i>				The Role of Social Capital in The Process of Labor Market Entry <i>Anton Andersson</i>
12:20	Break				
12:20-13:40	INSNA Business Meeting Salon 3				

Saturday – AM2 cont.

AM2	Sunset	Laguna	Cardiff	Coral Cove
	Egocentric Network Analysis: Theoretical and Methodological	Game Theory	Dynamics of Multilevel Networks	Networks and Teams
Chair	<i>Ann McCranie</i>	<i>Elisa Jayne Bienenstock</i>	<i>Julien Brailly</i>	<i>Alice Leung</i>
10:40	Social Networks of Youth and Young Adults Who Misuse Prescription Opioids and Heroin <i>Alia Al-Tayyib, Stephen Muth, Eric Rice and Paula Riggs</i>	Altruism as a Network Parameter in Game Theoretic Framework <i>William Leibzon</i>	Testing Higher-Order Network Structures in An Online Experiment <i>Jason Radford, Ram Ramanathan, Amotz Barnoy, Alexey Nikolaev, Saad Mneimneh and David Lazer</i>	Social Network Analysis of The FIFA 2014 World Cup: Quantification of Games Won By Germany <i>Keita Sugihara</i>
11:00	A Nationally Representative Sample of Ego-Centric Personal Cognitive Networks <i>Christopher Marcum and Laura Koehly</i>	Modeling Coalitions Within Constraints: An Integration of Social Network and Game Theories <i>Elisa Jayne Bienenstock and Michael Salwen</i>		Love Your Enemies: The Evolution of Network Ties and Team Performance in Major League Baseball, 1985 - 2013 <i>Lan Wang</i>
11:20	Ego-Network Characteristics and Transportation Mode Choice Conformity <i>Susan Pike, Louis Lubow and Mark Lubell</i>			Collaborations and Careers: Disentangling Quality Signaling From Collective Skill Formation in The Theater and Movie Industries <i>Fabien Accominotti</i>
11:40	Nomination Order and Alter Attributes in Adolescent Ego Networks <i>Mike Wood and Ethan Fridmanski</i>			Communications Patterns, Team Effectiveness, and Collaboration in A 3-Week Learning Game <i>Alice Leung, Ethan Mollick, William Ferguson and Lisa Scott</i>
12:00				
12:20	Break			
12:20-13:40	INSNA Business Meeting Salon 3			

Saturday – PM1

PM1 Chair	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Inter-Organizational Networks <i>Jef Vlegels</i>	Collective Action and Social Movements <i>David Tindall</i>	Mathematical Models <i>Elisa Bienenstock</i>	Networks and Religion <i>Sean F. Everton</i>	Archaeological Networks <i>Termeh Shafie, Viviana Amati</i>
13:40	A Comparative Analysis of Humanitarian Relief Networks After Two Natural Disasters <i>Chih-Hui Lai and Ying-Chia Hsu</i>	Wikis and Work Groups: A Social Network Approach To Predicting Community Growth <i>Jeremy Foote, Aaron Shaw and Benjamin Mako Hill</i>		Isolation and Apocalypticism: Anabaptists and the Münster Rebellion <i>Sean Everton, Dan Cunningham and Rob Schroeder</i>	Pottery Classification With Triad Tests On Network Positions <i>Jan Christoph Athenstädt, Katarina Enggist, Corinne Hofman and Ulrik Brande</i>
14:00	Untying The Knots: How Simmelian Ties Guide The Evolution and Performance of Multi-Partner Alliances <i>Sebastian Jayaraj, Marya Doerfel and Trefor Williams</i>	Intersections and Separations in Gender and Race-Focused Social Media Movements <i>Oliver Haimson, Juergen Pfeffer and Gillian Hayes</i>		Network Periphery, Group Boundaries, and The 40 Individuals in The 'Toronto 18' Terrorist Network <i>Marie Ouellet and Martin Bouchard</i>	Filtering Methods in The Archaeological Context <i>John Roberts, Matthew Peeples, Barbara Mills and Ronald Breiger</i>
14:20	The Formation and Evolution of State Emergency Operations Plan Networks <i>Nolan Phillips, Cedar League, Britta Johnson, Jeannette Sutton and Carter Butts</i>	Crowdsourcing Network Literacy: A Grassroots Story <i>Catherine Cramer, Mason Porter, Hiroki Sayama, Lori Sheetz and Stephen Uzzo</i>	Unwinding The Hairball Graph: Pruning Algorithms For Weighted Complex Networks <i>Navid Dianati</i>	Applied and Research Applications of Social Network Analysis With Religious Congregations <i>Nathan Todd</i>	Cassowary Bone Daggers From Papua New Guinea: Similarity Networks, ERGM, and Spatial Modelling, What Can They Tell Us? <i>James Zimmer-Dauphinee, Mark Golitko, Esther Schechter, Termeh Shafie, John Terrell</i>
14:40	Relationship Marketing in Guanxi Networks: A Social Network Analysis Study of Chinese Construction Small and Medium-Sized Enterprises <i>Sulafa Badi, Lisha Wang and Stephen Pryke</i>	Exploring ISIL Cyber Network Activities: Evolution, Means, and Strategies <i>Samer Al-Khateeb, Muhammad Hussain and Nitin Agarwal</i>	Latent Space Network Models of Statistics Journal Citations <i>Jane Carlen and Mark Handcock</i>		Inferring Networks of Diffusion Using Classic Maya Ritual Inscriptions <i>Habiba Habiba, Jessica Munson, Jonathan Scholnick and Viviana Amati</i>
15:00	Exploring The Impact of Location On University-Business Relationships in Belgium: A Social Network Approach <i>Jef Vlegels and Andre Spithoven</i>	Social Fabric, Time of Day, and Fear of Crime <i>John Hipp, Adam Boessen, Carter Butts, Nicholas Nagle and Emily Smith</i>	An Influence Maximization Approach To Enhance Or Degrade Networks By Analyzing Multiple Chess Games <i>Anthony Johnson and Chane Jackson</i>	Disentangling Religious Homophily in Adolescent Friendship Networks <i>Harrison Carter and Kevin Lewis</i>	Game Theory and Network Models For The Reconstruction of Networks <i>Viviana Amati and Ulrik Brandes</i>
15:20					
15:40	Coffee Break, Newport Coast Ballroom Foyer				

Saturday – PM1 cont

	Sunset	Laguna	Cardiff	Coral Cove	Copper Cove
PM1	Network Effects On Individual Health and Health Behavior	Networks and Teams: MURI Panel	Dynamics of Multilevel Networks	Social Networks and Health Inequalities	Negative Ties and Signed Graphs
Chair	Luke Matthews	Ambuj Singh, Kayla de la Haya	Julien Brailly	Markus Gamper	Alexandra Gerbasi
13:40	Social Influence On 5-Year Survival in A Longitudinal Chemotherapy Ward Co-Presence Network Jeffrey Lienert, Christopher Marcum, John Finney, Felix Reed-Tsochas, Laura Koehly	Dynamics of Collective Performance in Collaboration Networks Victor Amelkin, Omid Askarisichani, Young Ji Kim, Ambuj K. Singh, Thomas W. Malone	Investigating Organizational Identities in Multilevel Networks With Multiple Membership, Multiple Classification Models Alessandro Lomi, Francesca Pallotti, Mark Tranmer and Anna Piazza	Ego Network Predictors of Help-Seeking For Oral Health Problems Among Mexican Immigrants To The American Midwest Erin Pullen, Gerardo Maupome, Brea Perry and Eric Wright	Who Bullies Whom? Level and Direction in Single-Grade and Multi-Grade Classrooms Ashwin Rambaran, Marijtje Van Duijn, Rene Veenstra and Jan Dijkstra
14:00	Tweet2Quit: Communication Networks and Smoking Abstinence in A Group-Based Intervention Jingbo Meng, Ashley Sanders-Jackson, Connie Pechmann, Judith Prochaska	A Formal Theory of The Evolution of Social Power: Natural Trajectories of Interpersonal Influence Systems Along Issue Sequences Noah E. Friedkin, Peng Jia and Francesco Bullo	Siena Models of Interdependent Use of Cigarettes, Alcohol, and Marijuana Cheng Wang, John Hipp, Carter Butts, Rupa Jose and Cynthia Lakon	The Effect of Social Networks On Adults' Health: A Counterfactual Approach To The Indonesian Family Life Survey Julia Schröders	When Friendship Turns Sour: The Effect of Interethnic Friendship Dissolution On Interethnic Attitudes Sanne Smith
14:20	Predictive Health Analytics With Networks Luke Matthews	Overcoming Decision Biases Through Network Structure Matthias Leiss, Christian Schultz, Eموke Agnes Horvat, Dirk Helbing, Brian Uzzi		Using Ego-Centric Networks to Evaluate the Impact of a Suicide and Alcohol Use Disorder Intervention for Rural Yup'ik Alaska Native Youth Jacques Philip, Tara Ford, David Henry, Kirk Dombrowski, Stacy Rasmus and Jim Allen	Price and Position Amongst Friends and Enemies: Preferential Attachment and Hierarchy in Positive and Negative Ties. Bing Yang Tan, Nicholas Harrigan, and Janice Yap
14:40	The Influence of Social Networks On Maternal Health Behaviors of Women of Reproductive Age in Ghana, West Africa Leanne Dougherty, Thomas Valente and Emily Stammer	Who To Ask? Analysis of Information Robustness Huajie Shao, Tarek Abdelzaher	Multi-Agent Agency Network Reticulation Alex Yahja, Marshall Scott Poole, Steven Corman, Cleotilde Gonzalez, Norbou Buchler, Christian Lebiere, Vladislav "daniel" Veksler, Don Morrison	Transition To Motherhood in Hardship Situation in Romania: Disorganized Family Networks As A Cumulative Disadvantage Marlene Sapin	Difficult People: Who Is Felt To Be Demanding? Claude Fischer and Shira Offer
15:00	Does Ending Homelessness Change Social Networks and Support? Suzanne Wenzel, Harmony Rhoades, Hailey Winetrobe, Benjamin Henwood, Eric Rice	Discussant Kyle Lewis		The Relation of Unemployment, Health and The Role of Social Networks Andreas Eberl, Gerhard Krug and Katharina Seebaß	A Broader Perspective On Intergroup Contact: Extended Positive and Negative Ties Eva Jaspers
15:20	Insights For Peer Based HIV Prevention For Homeless Youth From A 2 Year Panel Study of Whole Networks Eric Rice, Harmony Rhoades, Hailey Winetrobe, Amanda Yoshioka-Maxwell, Jaih Craddock, Robin Petering			Dynamic Interactions of Social Networks and Health of Long-Term Unemployed: Results From A Qualitative Research Project in Germany Andreas Klaerner, André Knabe, Sylvia Keim, Hagen Fischer and Markus Gamper	Amity and Enmity: A Multiplex Group Approach Using Identity-Types of Ties Jonathan Morgan and Jaemin Lee
15:40	Coffee Break, Newport Coast Ballroom Foyer				

Saturday – PM2

PM2	Salon 5	Salon 4	Salon 3	Salon 2
	Adolescent Friendship Networks	Corporate Networks	Culture, Ethnicity and Networks	Gendered Networks
Chair	<i>Nayan Ramirez</i>	<i>Roy Barnes</i>	<i>Christopher Browning</i>	<i>Neha Gondal</i>
16:00	Gender Differences in Friend Selection and Peer Influence: Applying A Dynamic Network Approach To Study Adolescent Delinquency, Drinking, and Smoking <i>Cassie McMillan</i>	Globalists in The American Inner Circle <i>Joshua Murray</i>	Fleeting Friendships - The Stability of Adolescents' Cross-Race Friendships <i>Balint Neray and James Moody</i>	Gender Differences in Online Network Structure: A Comparison of Two Virtual Worlds <i>Cuihua Shen and Grace Benefield</i>
16:20	Selection Heterogeneity in The Effects of Extracurricular Activities On Friendship <i>Andrea Vest Ettekal, David Schaefer</i>	Refineries of Denial: A Fossil Fuel Power Structure At Koch Industries' Political Strategy Meetings <i>Michael C Dreiling and Jeff Gunn</i>	Partner Choice and Reciprocity in Hadza Food Sharing Preferences <i>James Holland Jones and Brian Wood</i>	Who Does Academic Inequality Hurt More? An Examination of Academic Placement By Professorial Rank, Gender, and Discipline <i>Neha Gondal</i>
16:40	(Dis)Embedded Aggression in Multiplex Networks: Effects of Perceptual Overlap and Robustness of Positions On Bullying Among Adolescents <i>Malte Doehne, Michael Von Grundherr and Anja Geisler</i>	Pluralism and Elitism in The Global Corporate Elite: A Big Data Network Analysis Approach <i>Eelke Heemskerk</i>	Adolescents' Antipathy Networks: Does Migration History and Minority Status Matter? <i>Daniel Alexandrov, Vera Titkova and Valeria Ivaniushina</i>	
17:00	Sexual Minorities' Peer Network Characteristics and Behavioral Change Across Adolescence <i>Nayan Ramirez</i>	Discussant <i>Bill Domhoff</i>	Socioeconomic Segregation of Activity Spaces in Urban Neighborhoods: A Network Approach <i>Christopher Browning, Catherine Calder, Lauren J. Krivo, Anna L. Smith and Bethany Boettner</i>	
17:20	Break			
21:00 to 24:00	Hospitality <i>Presidential Suite</i>			

Saturday – PM2 cont.

PM2 Chair	Salon 1	Laguna	Cardiff	Coral Cove
	Egocentric Network Analysis: Theoretical Methodological <i>Bernice Pescosolido</i>	Social Networks in Enterprise and Governance <i>Nga Nguyen</i>	Words and Networks <i>Jana Diesner, Peter Gloor</i>	Networked Innovation <i>Julia Brennecke</i>
16:00	Networked Cultural Knowledge: Cultural Consensus and Cultural Consonance in Personal Networks <i>Rosalyn Negron, Linda Sprague-Martinez, Eduardo Siqueira and Cristina Brinkerhoff</i>	The Roles of Networks in SMEs' Internationalisation <i>Nuntana Udomkit and Claus Schreier</i>	The Spatial Properties of Radical Environmental Organizations in The UK <i>Benjamin Bagozzi and Zack Almquist</i>	Knowledge Networks of Top Managers in The Fashion Industry: The Relational Embeddedness <i>Alexander Fliaster and Sonja Sperber</i>
16:20	Identity Change and Reversion From Islam: An Egocentric Social Network Perspective <i>Sakin Erin</i>	The Evolution Of Social Networks In Collaborative Natural Resource Governance <i>Matt Robbins and Mark Lubell</i>	How Consumers and Activists Amend Their Semantic Networks <i>Michelle Shumate and Amy O'Connor</i>	Abandoning Innovations: Network Evidence On Enterprise Collaboration Software <i>Jacob Fisher, Yong-Mi Kim and Jonathon Cummings</i>
16:40	Segregation, Integration, Or Isolation: Immigrants' Personal Networks and Social Capital <i>Ying Chia Hsu and Chen-Chao Tao</i>	Interorganizational Networks and Strategy: Evidence From An Italian Footwear District <i>Riccardo De Vita, Stefano Ghinoi and Alessandro Sinatra</i>	Information Diversity and Structural Diversity in A Changing Environment <i>Jesse Fagan</i>	
17:00	Dental Problems Among Mexican Immigrants To The American Midwest: An Examination of Oral Health Matters Network Characteristics <i>Gerardo Maupome, Erin Pullen, Brea Perry and Eric Wright</i>	Consumer Credit and Household Banking Networks in Renaissance Florence <i>Paul McLean</i>	Interplay Between Personal Morals With Tie and Cluster Formation in A Corporate Communication Network <i>Craig Evans, Rezvaneh Rezapour, Ming Jiang and Jana Diesner</i>	
17:20	Break			
21:00 to 24:00	Hospitality <i>Presidential Suite</i>			

Sunday – AM1

AM1	Salon 5	Salon 4	Salon 3	Salon 2
	Mixed Methods Studies	Corporate Networks	Internet of Things (IoT) With Social Media and Social Networks	Social Networks and Migration
Chair	<i>Betina Hollstein</i>	<i>Joshua Murry</i>	<i>Jang Hyun Kim</i>	<i>Olga V. Mayorova</i>
08:40	Using Qualitative Comparative Analysis (QCA) To Address Debates in The Literature About Centralisation and Density of Covert Networks. <i>Gemma Edwards, Susan O'Shea, Nick Crossley, Martin Everett and Johan Koskinen</i>	Stability and Change in Corporate Governance Networks <i>Lasse Folke Henriksen, Anton Grau Larsen and Christoph Houman Ellersgaard</i>	Dynamics of The Worldwide Web: A Longitudinal Analysis of The Two-Mode Network of Website Use By Country <i>George Barnett, Ke Jiang and Billy Liu</i>	
09:00	Citing For Existing: Building French Management Studies' Autonomy By Relying On US References (1965-1975) <i>Nicolas Guilhot and Benoit Cret</i>	On Data Quality in Big Corporate Network Analysis <i>Javier Garcia-Bernardo, Frank Takes and Eelke Heemsker</i>	How Social Media Companies Perceive and Corporate With Internet of Things <i>Minju Yoo, Jang Hyun Kim and Kang-Nyeon Lee</i>	Network Specificities of Circular Migrants in Rural Senegal <i>Yacine Boujija, Laetitia Douillot and John Sandberg</i>
09:20	The Measurement of Guanxi Circle - Using Qualitative Study To Modify Quantitative Measurement <i>Jar-Der Luo and Han Xiao</i>	Search in Networks With Vacancies: The Case of Board Interlocks <i>Mitri Kittu, Matti Pihlava and Hannu Salonen</i>	How Internet of Things Changed Online-Community <i>Seunghee Han, Hyoungbo Shim and Jang Hyun Kim</i>	Climate Change and Population Movement <i>Larry Lin and Kathleen Carley</i>
09:40	Neural Signatures of Social Valuation Predict Future Liking <i>Noam Zerubavel, Mark Hoffman, Adam Reich and Peter Bearman</i>	Friends in Low Places: Dynamics of Tie Formation Following Financial Restatements <i>Michael Howard, Michael Withers and Laura Jones</i>	"Who Communicates with Whom": Social Capital, Designer Performance and Network Formation in the Online Brand Community <i>Yao Sun</i>	Filipino Nurses, Domesticity, and Careworkers in New York City and London: Networks, Mobility, and Integration <i>Rizza Kaye Cases</i>
10:00		The Naissance and Geographical Spread of Quantitative Research Into Corporate Interlocks <i>Meindert Fennema and Eelke Heemsker</i>	A Semantic and Social Network Analysis of Nam June Paik in Cyberspace <i>Yoo Jung Hong, Jung Ah Shin and Jang Hyun Kim</i>	Geography, Gendered Networks and Well-Being: The Case of Forced Migrants in Georgia <i>Olga Mayorova and Beth Mitchneck</i>
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Sunday – AM1 cont.

AM1 Chair	Sunset	Laguna	Cardiff	Baycliff
	Scientific Collaboration Networks <i>Grace Huang</i>	SNA in Russia: Progress and Prospects <i>Valentina Kuskova</i>	Networked Innovation <i>Julien Brailly</i>	Networks and Teams <i>Kate Coronges</i>
08:40	Collaboration Networks and Structural Influence in Mental Health <i>Jeffrey Proulx, Chengyu Fang and Justin Mozelle</i>	Overcoming Entrepreneurial Project Failure: Social Networks Influence <i>Liudmila Petrova, Valentina Kuskova and George Beknazar-Yuzbashev</i>	From Crowdfunding To Co-Production: Community Building Towards Collective Action On Kickstarter <i>Rong Wang, Li Lu and Janet Fulk</i>	Network Structure and Team Performance: Study of Slovene and Finish Organizations <i>Barbara Lužar, Helena Kovačič, Hajdeja Iglič and Andrej Rus</i>
09:00	How Knowledge Travels: An Analysis of The Diffusion of Philosophy of Science Over 60 Years <i>John McLevey and Kathryn S Plaisance</i>	Quantifying Political Power: Applied Network Research Approach <i>Alina Vladimirova and Valentina Kuskova</i>	The Crowd-Sourced Graph: Uncovering The Social Innovation Landscape in Austin, Texas <i>Mark Hand and Clare Zutz</i>	Command-and-Control Agility Under Adversarial Conditions <i>Ertugrul Ciftcioglu, Siddarth Pal, Kevin Chan, Ananthram Swami, Derya Cansever, Ambuj Singh and Prithwish Basu</i>
09:20	Use of Network Analysis To Assess Collaboration Readiness Among Researchers and Affiliated Practice Partners in The State and Community Tobacco Control Research Initiative <i>Grace Huang, Michael Steketee, Julie Bromberg, Keith Macallum, Janet Okamoto and Elizabeth Ginexi</i>	Social Network Analysis Approach To Team Sports: Centrality Tendencies of Best Teams Based On Player Selection. <i>Antonina Milekhina</i>	Patent Citation Distance: Measuring Trends in Combinatorial Innovation <i>Ryan Whalen and Noshir Contractor</i>	Structures of Influence: Formal and Informal Leadership Dynamics <i>Kate Coronges</i>
09:40		Anonymity and Social Image in Ultimatum and Dictator Games <i>George Beknazar-Yuzbashev and Yana Maria Priestley</i>		Who Needs An Alter Anyways? Using The Ego-Centric Relational Event Model To Analyze Teams in Open Communication Networks <i>Andrew Pilny, Scott Poole, Jeff Proulx, Ly Dinh and Mufan Luo</i>
10:00		Latent Space Model For Community Detection Based On Information Cascades <i>Igor Zakhlebin and Aleksandr Semenov</i>		
10:20	Coffee Break, Newport Coast Ballroom Foyer			

Sunday – AM2

AM2	Salon 5	Salon 4	Salon 3	Salon 2	Salon 1
	Corporate Networks	Social Media Networks: Challenges and Solutions	Innovation and Diffusion	SNA in Russia: Progress and Prospects	Mixed Methods Studies
	Chair <i>Eelke Heemskerk</i>	<i>Juergen Pfeffer</i>	<i>Jungyun Han</i>	<i>Valentina Kuskova</i>	<i>Betina Hollstein</i>
10:40		Understanding The Different Networks On Social Media <i>Kar-Hai Chu, Daniel Soto, Kayla de la Haye, Thomas Valente, Tess Cruz, Jennifer Unger</i>		Network Studies in Russia: The Structure of A Scientific Community <i>Daria Maltseva</i>	Sensitive Self-Disclosures and Responses On Instagram <i>Nazanin Andalibi, Pinar Ozturk and Andrea Forte</i>
11:00	How Do Firms' Networks Affect Their Participation in Business Seminars and Subsequent Behaviors? Evidence From A Randomized Controlled Trial in Vietnam <i>Daichi Shimamoto, Yuri Kim and Yasuyuki Todo</i>	Platform Effects in Social Media Networks <i>Momin Malik and Juergen Pfeffer</i>	Network Interventions For Managing The Diffusion of Health Beliefs <i>Jun Zhao and Dawn T Robinson</i>	Changing Role of Personal Ties in Russian Labour Market <i>Elena Artyukhova and Olga Mayorova</i>	Identifying Emerging Research Fields Through Community Detection in Scientific Collaboration Networks At A Research University <i>Therese Kennelly Okraku, Raffaele Vacca, Chris McCarty, Valerio Leone Sciabolazza</i>
11:20	The Silicon Valley Wage Cartel: How Cartel Membership Spreads and Its Impact On Management Job Transitions <i>Jon Mackay and James Wilson</i>	Euromaidan Vs Twitter: Evolution of Social Movement Communication Networks <i>Robert Schroeder, Sean Everton and Daniel Leroy</i>	Gender Role-Based Deference in Multiplex Ties Between Korean Business Groups <i>Jungyun Han</i>	Cross-Buying Customer Behavior in Internet Shopping in Russia From The Network Perspective <i>Igor Sloev and Elena Artyukhova</i>	Offline Networks On Online Communities: A Mixed-Methods Approach <i>Spyros Angelopoulos and Yasmin Merali</i>
11:40				Diffusion and Discussion Networks On Twitter: The Case of Protest Meetings in Russia <i>Aleksandr Semenov, Igor Zakhlebin and Alexander Tolmach</i>	
12:00				The International Trade Network: Sanctions Performing As A Strength Test of Economic Ties <i>Yulia Wasserman and Valentina Kuskova</i>	
12:20	Conference Close				

Sunday – AM2 cont.

AM2 Chair	Laguna	Cardiff	Baycliff
	Networks in Global Health <i>Jessica Shearer</i>	Socio-Semantic Networks <i>Nikita Basov</i>	Negative Ties and Signed Graphs <i>Josh Marineau</i>
10:40	Modeling Preferential Recruitment For Respondent-Driven Sampling <i>Katherine McLaughlin</i>	Latent Cognitive Social Spaces: Theory and Methods For Extracting Prejudice From Text <i>Kenneth Joseph and Kathleen Carley</i>	The Interplay Between Creative Problem-Solving Interactions and Difficult Ties in Organizations <i>Julia Brennecke, Dean Lusher and Michael Gilding</i>
11:00	Social Network Analysis: Evaluating A Community Health Mobilization Strategy Using A Women's Microfinance Platform in Uttar Pradesh, India <i>Jenny Ruducha, James Potter and Robin Lemaire</i>	Toward A Computational Hermeneutics For Social Network Analysis <i>John W. Mohr, Robin Wagner-Pacifici and Ronald L. Breiger</i>	A Social Network Perspective On The Influence of Social Context On Supervisor Perceptions of Counterproductive Behavior <i>Christopher Sterling and Travis Grosser</i>
11:20	Assessing The Implementation Strength of Health Message Dissemination Networks in Uttar Pradesh, India Through Egocentric Snowball Sampling <i>James Potter and Jenny Ruducha</i>	Exploring The Meaning of Interdisciplinary Collaboration in A Scientific Organization: An Application of Text and Network Analysis <i>Ly Dinh</i>	Why All The Negativity? An Empirical Analysis of The Determinants of Negative Ties <i>Alexandra Gerbasi, Eric Quintane and Joe Labianca</i>
11:40	Rubrics: A Mixed-Methods Approach To Measuring and Evaluating Networks <i>Jessica Shearer, Emily Carnahan and Caroline Soi</i>		Do You See What I See? Role of Homophily in Organizational Social Structure Perception <i>Joshua Marineau and Sukamarakurup Krishnakumar</i>
12:00	Empowering Health Workers in Low-Resource Areas To Engage in Network Analysis <i>Emily Beylerian and Jessica Shearer</i>	Translational Research in Medicine: A Multi-Modal Approach To Inter- and Transdisciplinary? <i>Iina Hellsten and Loet Leydesdorff</i>	
12:20	Conference Close		

Posters – Friday 5:30-7:30 PM, Grand Pacific Ballroom

Title	Authors
A dark ecology of law-breakers	Christofer Edling and Amir Rostami
A Two-mode Network Analysis of Top Crowdfunding Donors in Structural Equivalence	Larry Zhiming Xu
Understanding the Movie Trailer: A Word of Mouth Perspective	Julia Kampani, Chris Archer-Brown and Haiming Hang
Alcohol and Social Network Changes During the Transition from High School to College	Matthew Meisel and Nancy Barnett
An examination of the patent networks: a peek at patent thickets from different technology classes.	Mateusz Gątkowski, Pablo Benalcazar, Marek Dietl, Przemysław Kaszyński and Jacek Kamiński
Are you a Settler or a Nomad? Predicting Managerial Attrition via Email Network Analysis	Peter Gloor, Andrea Fronzetti Colladon, Gianni Giacomelli and Francesca Grippa
Changes in the phenomenology of student's social network	Olgica Klepač, Darja Maslić Seršić and Srebrenka Letina
Classroom Segregation Online?: Exploring Multilayered Media Networks Among High School Students	Naoki Maejima
Collective Problem-Solving in Networked Environments	Michael Foley and Christoph Riedl
Comparing Multilevel Social Capital Measures on Individual Effectiveness in Massively Multiplayer Online Game Teams	Grace Benefield and Cuihua Shen
Convolutional Neural Networks and SNA -- match made in heaven?	Maksim Tsvetovat, Sofia Dokuka and Diliara Valeeva
Developing MCMC sampling methods for estimating exponential random graph models	Maksym Byshkin, Alex Stivala, Antonietta Mira, Rolf Krause, Garry Robins and Alessandro Lomi
Directors' Brokerage Behavior and Career Outcomes During A Merger Process	Wookje Sung
Drug or alcohol use self-help group attendance and social network composition among drug users	Oluwaseun Falade-Nwulia, Tobin Karin and Carl Latkin
Drug Supply Networks: A Systematic Review of the Organizational Structure of Illicit Drug Trade	Gisela Bichler, Aili Malm and Tristen Cooper
Egocentric Network Characteristics and Disaster Preparedness in Rural Japan	Shigeki Toyama
Emergence of core discussion networks over time in online public forums	Sujin Choi
Emergency Management Organizations' Twitter Follower Growths During and After Disasters	Brian Espinoza, Nolan Phillips, Ben Gibson, Cedar League, Britta Johnson, Emma Spiro, Sean Fitzhugh, Jeannette Sutton and Carter Butts
Exploring Information-Optimal Network Discretization for Dynamic Network Analysis	Derek Doran and Matt Piekenbrock
Exploring social networks within a web and app based intervention for weight loss.	Sharon Anne Simpson, Juliana Pugmire, Lynsay Matthews and Laurence Moore
Foul-Weather Friends: Failure Tolerance in Organizational Networks	Jessica Santana
Friendship network characteristics in late childhood as predictors of physical activity in early adolescence	Jennifer Marks, Kayla de la Haye, Lisa Barnett and Steven Allender

Posters – Friday 5:30-7:30 PM, Grand Pacific Ballroom cont.

Title cont.	Authors cont.
Health and Familismo: Social Network Discussion of Oral Health Problems among Immigrants of Mexican Origin in the USA	William R. McConnell, Gerardo Maupome, Brea L. Perry and Eric Wright
Images of Social Capital	Christian Waldstrøm
Impacting the Contagion of Cheating	Ricky Grannis-Vu and Rick Grannis
Industry Cluster: Analysis of Web 2.0 Data to Support the Strategic Cluster Management	Julian Wilberg, Daniel Kammerl and Udo Lindemann
Informing crisis communication preparation and response through network analysis: Social mediators and mediated content in airlines' Twitter networks	Itai Himelboim, Bryan Reber and Yan Jin
Mapping Food Networks and Habits among SNAP Recipients	Darcy Freedman, Madalena Monteban, Kristen Matlack, Emily Jennings, Coleen Walsh and Kimberly Bess
Perceived Stress and Social Networks among Young Adults: A Longitudinal Study Measuring Social Interactions with Mobile data and Self-reports	Agnete Skovlund Dissing, Tobias Bornakke Jørgensen, Thomas Alexander Gerds, Naja Hulvej Rod, Rikke Lund
Modeling misclassifications in multilayer networks	Devin Gaffney
Network characteristics of microfinance borrowing groups	Jessica Burke, Teagen O'Malley, Jana Smith and Thomas Valente
Network Dynamics of the Structural Setup of Students' Networks	Lisa Thiele, Nils Christian Sauer, Martin Atzmueller, Gerd Stumme and Simone Kauffeld
Network locations and political orientations in Japan	Ryuhei Tsuji
Networking for Good: Nascent Social Entrepreneurs and Their Personal Networks	Jordi Comas
Older Adults Networking On and Off Digital Media: Initial Findings from the Fourth East York Study	Anabel Quan-Haase, Kim Martin, Meghan Miller, Barry Wellman and Christian Beermann
Opinion Dynamics Simulations: Pairwise versus Small-group Interaction	Trevor Cook, Alice Leung and John Hancock
Personality and the evolution of mentor social networks in a mentoring program for at-risk youth.	Neil Yetz, Kimberly Henry and Shelley Haddock
Professional Social Network Analytics for Enterprise Management	Weining Qian, Gopakumar Gopalakrishnan and Cheng Ding
RAND-Net: A new versatile tool for network analysis and visualization	Zev Winkelman, Raffaele Vardavas, Elizabeth Bodine-Baron, Ryan Brown and David Kennedy
Scalable Dynamic Sexual Contact Networks Coefficients Estimation with DNR Structure	Yue Yu, C Ben Gibson and Carter T Butts
Sexual Network Formation Among Undergraduate Students at the University of Cambridge	Mary-Catherine Anderson and Mary-Catherine Anderson
Social ties and physical distance	Adam Roth
Socialbots popping the political filter bubble on Twitter: network methods and theory in the context of Australian politics	Timothy Graham and Robert Ackland
Testing for the Existence of a Representative Interest Actor	Robert Ackland

Posters – Friday 5:30-7:30 PM, Grand Pacific Ballroom cont.

Title cont.	Authors cont.
The "Hub Effect": Airline Hubs as Facilitators of Theft from Passengers' Luggage	Tristen Cooper and Nerea Marteache
The impact of homophily and multiplex networks on the assembly of teams	Marlon Twyman, Leslie Dechurch and Noshir Contractor
The Internationalization of Scientific Knowledge Creation: Network Analysis of Sociological Collaboration	Crystal Peoples
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Grosser, Travis	FRI 09:00
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Grove, Morgan	FRI 14:40
Grover, Varun	THUR 09:00
Guadalupi, Luigi	SAT 11:40
Guan, Yi-Ren	SAT 09:00
Guilhot, Nicolas	SUN 09:00
Guimarães, Renato	SAT 08:40
Gunn, Jeff	SAT 16:20
Gutiérrez, Rafael M.	FRI 17:00
Ha, Thao	WED 15:00
Habecker, Patrick	THUR 10:00
Habiba, Habiba	SAT 14:40
Habinek, Jacob	WED 16:40
Hachen, David	THUR 11:20
Hachen, David	FRI 10:00
Haddock, Shelley	FRI 17:30
Hadley, Donald W.	FRI 10:40
Hagen, Christina	FRI 17:30
Haimson, Oliver	SAT 14:00
Halpern, Carolyn	FRI 11:40
Han, Jungyun	SUN 11:20
Han, Seunghee	SUN 09:20

Hand, Mark	SUN 09:00
Handcock, Mark	THUR 11:00
Handcock, Mark	SAT 14:40
Hang, Haiming	FRI 17:30
Hanneman, Robert	FRI 13:40
Hannon, Peggy	THUR 14:20
Harakeh, Zeena	FRI 11:00
Harling, Guy	THUR 14:40
Harrigan, Nicholas	SAT 09:00
Harrigan, Nicholas	SAT 14:20
Harrington, Stephanie	FRI 17:30
Havens, Jennifer	WED 16:00
Havens, Jennifer	THUR 14:20
Hayes, Gillian	SAT 14:00
Hazel, Ashley	THUR 13:40
Heemskerk, Eelke	SAT 10:40
Heemskerk, Eelke	SAT 16:40
Heemskerk, Eelke	SUN 09:00
Heemskerk, Eelke	SUN 10:00
Heidl, Ralph	WED 16:20
Heimer, Robert	THUR 09:00
Helbing, Dirk	SAT 14:20
Hellpap, Robert	WED 17:00
Hellsten, Iina	FRI 11:00
Hellsten, Iina	FRI 11:20
Hellsten, Iina	SUN 12:00
Hennig, Marina	FRI 17:00
Henry, David	SAT 14:20
Henry, Kimberly	FRI 17:30
Henry, Teague	SAT 09:20
Henwood, Benjamin	SAT 15:00
Herz, Andreas	THUR 13:40
Herz, Andreas	FRI 16:40
Heugens, Pursey	FRI 14:00
Hileman, Jacob	FRI 11:00
Himmelboim, Itai	FRI 17:30
Hing Phoa, Frederick	THUR 10:40
Hipp, John	THUR 15:20
Hipp, John	SAT 08:40
Hipp, John	SAT 14:00
Hipp, John	SAT 15:00
Hoffman, Mark	SUN 09:40
Hofman, Corinne	SAT 13:40
Hofstra, Bas	FRI 11:20
Hogg, Rachel	WED 16:40

Holland Jones, James	THUR 13:40
Holland Jones, James	SAT 16:20
Hollenbeck, John	WED 16:20
Holliday, Jo	SAT 09:20
Hollstein, Betina	FRI 14:20
Hollway, James	SAT 09:20
Hong, Seok-Hee	FRI 08:20
Hong, Seok-Hee	FRI 10:40
Hoon Jin, Ick	FRI 17:00
Hopkins, Christopher	WED 14:20
Hopkins, Christopher	THUR 14:20
Horvát, Emőke-Ágnes	THUR 11:20
Hosseini, Moein	FRI 10:40
Houston, Mark	SAT 10:00
Howard, Michael	SUN 09:40
Howe, Michael	WED 16:20
Hsu, Ying-Chia	SAT 13:40
Hsu, Ying-Chia	SAT 16:40
Hsung, Ray-May	FRI 09:40
Hsung, Ray-May	SAT 09:00
Hu, Adrienne	THUR 14:00
Huang, Grace	SUN 09:20
Hughes, Alex	SAT 12:00
Huh, Jimi	WED 15:20
Hulvej Rod, Naja	FRI 17:30
Hunter, Starling	FRI 15:20
Hussain, Muhammad	SAT 14:40
Hwong, Alison	SAT 12:00
Hyun Kim, Jang	SUN 09:00
Hyun Kim, Jang	SUN 09:20
Hyun Kim, Jang	SUN 10:00
Iglič, Hajdeja	SUN 08:40
Iorio, Alessandro	SAT 10:00
Ip, Edward	SAT 09:20
Iravani, Seyed	FRI 14:20
Isba, Rachel	WED 14:00
Ivaniushina, Valeria	THUR 09:00
Ivaniushina, Valeria	SAT 16:40
Jackson, Chane	SAT 15:00
Jackson, Joel	THUR 09:40
Jackson, Matthew	THUR 10:00
Jacobs, Anna	FRI 16:00
Jacobsen, Wade	FRI 15:00
Janulis, Patrick	WED 13:40
Janulis, Patrick	WED 14:00

Janulis, Patrick	WED 15:00
Jasny, Lorien	SAT 08:40
Jaspers, Eva	SAT 15:00
Jayaraj, Sebastian	SAT 14:00
Jenness, Samuel	WED 14:40
Jennings, Emily	FRI 17:30
Jeon, Gahyun	WED 16:20
Jia, Peng	SAT 14:00
Jiang, Ke	THUR 09:40
Jiang, Ke	FRI 08:20
Jiang, Ke	SUN 08:40
Jiang, Ming	SAT 17:00
Jiang, Zhongli	FRI 09:00
Jin, Yan	FRI 17:30
Johnson, Anthony	SAT 15:00
Johnson, Britta	FRI 17:30
Johnson, Britta	SAT 14:20
Johnson, Jeffrey C.	FRI 08:20
Johnson, Jeffrey C.	FRI 10:40
Johnson, Jeffrey C.	SAT 08:40
Johnson, Jeffrey C.	SAT 09:40
Johnson, Leah	WED 16:20
Jokisaari, Markku	SAT 09:40
Jonas, Adam B.	THUR 08:20
Jonas, Adam B.	THUR 09:20
Jonas, Adam B.	THUR 09:40
Jones, Laura	SUN 09:40
Jonsson, Jan O.	WED 17:00
Jose, Rupa	SAT 08:40
Jose, Rupa	SAT 14:00
Joseph, Kenneth	SUN 10:40
Joye, Dominique	THUR 08:40
Jung Hong, Yoo	SUN 10:00
Jung Yu, Yeon	THUR 14:40
Jurasek, Andy	THUR 14:00
Kadkhoda, Farbod	THUR 10:40
Kalfa, Dilan	SAT 16:40
Kali, Raja	THUR 14:40
Kamiński, Jacek	FRI 17:30
Kammerl, Daniel	FRI 17:30
Kammerl, Daniel	SAT 09:20
Kampani, Julia	FRI 17:30
Kamya, Carol	THUR 14:40
Kandori, Michihiro	FRI 17:30
Karin, Tobin	FRI 17:30

Karsai, Marton	THUR 14:40
Kaszyński, Przemysław	FRI 17:30
Kauffeld, Simone	FRI 17:30
Keegan, Thomas	WED 14:00
Keim, Sylvia	SAT 15:20
Kellner, Christiane	WED 16:00
Kennedy, David	THUR 14:00
Kennedy, David	FRI 11:00
Kennedy, David	FRI 11:40
Kennedy, David	FRI 17:30
Kennedy, Marie	FRI 11:00
Kennelly Okraku, Therese	SUN 11:00
Khan, Bilal	WED 13:40
Khan, Bilal	WED 14:00
Khan, Bilal	THUR 10:00
Khan, Bilal	FRI 17:30
Kharchenko, Maxim	THUR 12:00
Kharmats, Anna	WED 16:20
Khokhlova, Anisya	FRI 11:20
Kim, David	SAT 12:00
Kim, Hanjoo	THUR 11:00
Kim, Yong-Mi	SAT 16:20
Kim, Young	SAT 13:40
Kim, Yuri	SUN 11:00
Kitti, Mitri	SUN 09:20
Klaerner, Andreas	SAT 15:20
Klein, Till	FRI 09:20
Klepač, Olgica	FRI 17:30
Klovdahla, Alden	SAT 10:00
Knabe, André	SAT 15:20
Koban, Donald	FRI 17:30
Koehly, Laura M.	FRI 10:40
Koehly, Laura M.	SAT 11:00
Koehly, Laura M.	SAT 13:40
Kogut, Bruce	FRI 08:40
Kohn, Marlana	THUR 14:20
Koku, Emmanuel	FRI 16:40
Koku, Emmanuel	FRI 17:00
Koliba, Christopher	FRI 14:40
Koons, Anna	FRI 14:40
Kornienko, Olga	WED 15:00
Korniyenko, Yevgeniya	THUR 14:20
Koskinen, Johan	THUR 09:40
Koskinen, Johan	FRI 10:40
Koskinen, Johan	FRI 11:40

Koskinen, Johan	FRI 16:20
Koskinen, Johan	SUN 08:40
Koslowsky, Meni	FRI 17:30
Kovačič, Helena	SUN 08:40
Krackhardt, David	SAT 10:40
Krackhardt, David	SAT 11:20
Krackhardt, David	SAT 11:40
Krafft, Peter	THUR 09:40
Krause, Rolf	FRI 17:30
Kreager, Derek	WED 14:00
Kreager, Derek	FRI 11:20
Kreager, Derek	FRI 17:00
Krempel, Lothar	FRI 08:20
Krempel, Lothar	FRI 10:40
Krenz, Till	THUR 13:40
Kretschmer, David	THUR 14:40
Krishnakumar, Sukamarakurup	SUN 11:40
Krivitsky, Pavel N.	FRI 16:00
Krivo, Lauren J.	SAT 17:00
Kroenke, Candyce	FRI 11:40
Kronegger, Luka	WED 16:20
Kronegger, Luka	SAT 11:20
Kronegger, Luka	SAT 11:40
Krug, Gerhard	SAT 15:00
Krymkowski, Daniel	FRI 14:40
Kuhns, Lisa	SAT 10:00
Kumar, Vineet	SAT 11:20
Kumar, Vineet	SAT 11:40
Kuppens, Miet	THUR 14:00
Kushi, Larry	FRI 11:40
Kuskova, Valentina	SUN 08:40
Kuskova, Valentina	SUN 09:00
Kuskova, Valentina	SUN 12:00
Kusuma Dewi, Sonya	FRI 14:00
Kuznetsov, Ivan	FRI 11:40
Kwan, Marilyn	FRI 11:40
Kyndt, Eva	THUR 10:40
Laat, Maarten	THUR 11:40
Labianca, Carlo J	SAT 08:20
Labianca, Giuseppe -Joe	FRI 09:00
Labianca, Joe	SAT 08:20
Labianca, Joe	SUN 11:20
Labrecque, Jennifer	SAT 09:40
Lai, Chih-Hui	SAT 13:40
Lakon, Cynthia	SAT 08:40

Lakon, Cynthia	SAT 14:00
Lalonde, Bastien	WED 16:00
Lambe, Fiona	THUR 15:00
Langle-Flores, Alfonso	FRI 17:00
Lapides, J.R.	FRI 08:40
Larsen, Mark	FRI 08:40
Latkin, Carl	THUR 08:40
Latkin, Carl	FRI 17:30
Laumann, Edward	SAT 10:00
Laureiro-Martínez, Daniella	FRI 09:20
Lavoie, Rémi	WED 16:00
Law, Jennie	FRI 16:20
Lawlor, Jennifer	WED 14:00
Lawlor, Jennifer	THUR 08:20
Lazega, Emmanuel	WED 14:40
Lazega, Emmanuel	SAT 14:20
Lazer, David	FRI 09:00
Lazer, David	SAT 10:40
League, Cedar	FRI 17:30
League, Cedar	SAT 14:20
Leaver, Adam	THUR 09:00
Lebiere, Christian	SAT 14:40
Lecuona, Ramon	THUR 09:40
Lee, Byungkyu	SAT 08:20
Lee, Francis	THUR 14:00
Lee, Jaemin	FRI 11:40
Lee, Jaemin	SAT 15:20
Lee, Kang-Nyeon	SUN 09:00
Lee, Keunbok	FRI 14:00
Lee, Seungyoon	THUR 11:40
Leibzon, William	SAT 10:40
Leischow, Scott	THUR 11:00
Leiss, Matthias	SAT 14:20
Lemaire, Robin	SUN 11:00
Leone Sciabolazza, Valerio	WED 16:20
Leone Sciabolazza, Valerio	SUN 11:00
Leonidov, Andrei	FRI 09:20
Lerman, Kristina	SAT 08:40
Leroy, Daniel	SUN 11:20
Lesser, Ofrit	FRI 17:30
Letina, Srebrenka	FRI 17:30
Letina, Srebrenka	SAT 10:40
Leung, Alice	SAT 12:00
Levy, Michael	FRI 13:40
Lew, Rod	FRI 16:40

Lewis, Kevin	SAT 15:00
Leydesdorff, Loet	SUN 12:00
Li, Baojia	FRI 09:00
Li, Jianghong	THUR 09:00
Li, Jianghong	SAT 08:20
Li, Yiqun	WED 16:40
Liang, Faming	FRI 17:00
Lienert, Jeffrey	SAT 13:40
Light, Ryan	WED 14:00
Lin, Chang Z.	FRI 11:40
Lin, Feng	FRI 09:00
Lin, Gi-Yi	FRI 09:40
Lin, Larry	SUN 09:20
Lin, Wei-Ting	FRI 09:00
Lind, Benjamin	FRI 10:40
Lind, Benjamin	FRI 11:20
Lindemann, Udo	FRI 17:30
Lindemann, Udo	SAT 09:20
Liu, Billy	SUN 08:40
Liu, Kayuet	SAT 09:00
Liu, Wenlin	WED 15:00
Liu, Yusi	WED 16:40
Lizardo, Omar	THUR 11:20
Lizardo, Omar	FRI 10:00
Lo, Sharon	THUR 09:40
Lockhart, Ginger	SAT 09:00
Lohfeld, Lynne	FRI 13:40
Lomi, Alessandro	THUR 09:20
Lomi, Alessandro	FRI 11:20
Lomi, Alessandro	FRI 13:40
Lomi, Alessandro	FRI 17:30
Lomi, Alessandro	SAT 13:40
Long, Emily	SAT 09:00
Louzoun, Yoram	SAT 11:00
Lowry, Ruth	FRI 16:40
Lu, Li	SUN 08:40
Lubell, Mark	FRI 11:00
Lubell, Mark	FRI 13:40
Lubell, Mark	SAT 09:00
Lubell, Mark	SAT 11:20
Lubell, Mark	SAT 16:20
Lubow, Louis	SAT 11:20
Lund, Rikke	FRI 17:30
Lund, Rikke	FRI 17:30
Lungeanu, Alina	FRI 11:20

Luo, Jar-Der	SUN 09:20
Luo, Mufan	SUN 09:40
Luo, Wei	SAT 08:40
Lusher, Dean	THUR 11:40
Lusher, Dean	FRI 09:20
Lusher, Dean	FRI 16:20
Lusher, Dean	SUN 10:40
Lužar, Barbara	SUN 08:40
MacAllum, Keith	SUN 09:20
Macfarlane, Nina	FRI 17:30
Mackay, Jon	SUN 11:20
Maejima, Naoki	FRI 17:30
Mako Hill, Benjamin	SAT 13:40
Maldonado, Luis	WED 14:40
Mali, Franc	SAT 11:20
Malik, Momin	SUN 11:00
Malm, Aili	FRI 17:30
Malone, Thomas W.	SAT 13:40
Maltseva, Daria	SUN 10:40
Mani, Dalhia	SAT 09:40
Marcum, Christopher S.	FRI 10:40
Marcum, Christopher S.	SAT 11:00
Marcum, Christopher S.	SAT 13:40
Margolin, Drew	FRI 09:00
Marin, Alexandra	THUR 08:20
Marin, Alexandra	FRI 13:40
Marineau, Joshua	SUN 11:40
Marks, Jennifer	FRI 17:30
Marteache, Nerea	FRI 17:30
Marteleteo, Regina Maria	WED 17:00
Martin, Kacy L	THUR 15:00
Martin, Kim	FRI 17:30
Martinez, Jaime	FRI 16:40
Matlack, Kristen	FRI 17:30
Matthews, Luke	SAT 14:20
Matthews, Lynsay	FRI 17:30
Mattsson, Carolina	FRI 09:00
Maupome, Gerardo	FRI 17:30
Maupome, Gerardo	SAT 13:40
Maupome, Gerardo	SAT 17:00
Maxwell, Annette E.	THUR 14:20
May, Peter	FRI 14:20
Mayorova, Olga	SUN 10:00
Mayorova, Olga	SUN 11:00
McCarty, Chris	SUN 11:00

McCarty, Christopher	THUR 14:40
McCarty, Christopher	SAT 09:20
McConnell, William R.	FRI 17:30
McCulloh, Ian	THUR 09:20
McCulloh, Ian	THUR 12:00
McCumber, William	FRI 11:00
McFarland, Daniel	FRI 15:20
McFarland, Daniel	FRI 16:00
McKenzie, Vicki	THUR 09:20
McLaughlin, Katherine	SUN 10:40
McLean, Paul	SAT 17:00
McLevey, John	SUN 09:00
McMillan, Cassie	SAT 16:00
Medeuov, Darkhan	WED 16:20
Mehra, Ajay	FRI 10:40
Meisel, Matthew	FRI 17:30
Melamed, David	FRI 10:40
Menapace, Paola	FRI 08:40
Mendel, Peter	THUR 10:40
Mendelsohn, Joshua	THUR 13:40
Menezes, Mozart	SAT 08:40
Meng, Jingbo	SAT 14:00
Merali, Yasmin	SUN 11:20
Meredith, Chloé	THUR 10:40
Meredith, Chloé	THUR 11:20
Messer, Lynne	FRI 14:40
Meza, Xanat	THUR 09:40
Mezias, Stephen J.	SAT 10:00
Michaels, Stuart	THUR 08:20
Michaels, Stuart	THUR 09:40
Michelangeli, Alessandra	SUN 09:20
Milekhina, Antonina	SUN 09:20
Miles, Jeremy	FRI 14:00
Milkoreit, Manjana	FRI 14:20
Miller, Meghan	FRI 17:30
Miller, Ryan	FRI 09:00
Mills, Barbara	SAT 14:00
Mills, Kristen	THUR 08:20
Millward, Peter	WED 15:20
Min Kim, Chong	THUR 12:00
Mira, Antonietta	FRI 17:30
Mirc, Nicola	WED 14:40
Mistry, Dina	WED 13:40
Mitchneck, Beth	SUN 10:00
Mneimneh, Saad	SAT 10:40

Moen, Erika	THUR 14:00
Mohr, John W.	SUN 11:00
Moiseev, Stanislav	FRI 10:40
Moiseev, Stanislav	FRI 11:20
Mollick, Ethan	SAT 12:00
Mongeau, Pierre	THUR 10:40
Mongeau, Pierre	THUR 11:40
Monsalvo-Velázquez, Maria Gabriela	SAT 11:00
Monteban, Madalena	FRI 17:30
Moody, James	FRI 11:40
Moody, James	SAT 16:00
Moolenaar, Nienke	THUR 11:00
Moore, Andrew	FRI 16:20
Moore, Laurence	FRI 17:30
Moore, Laurence	SAT 09:20
Moorith, Gayatri	THUR 09:00
Morgan, Geoffrey	FRI 16:20
Morgan, Jonathan	SAT 15:20
Morris, Katherine	THUR 14:40
Morrison, Don	SAT 14:40
Morstatter, Fred	FRI 15:00
Moses, Joshua	FRI 17:30
Mosher, Heather	THUR 09:00
Mozelle, Justin	SUN 08:40
Mrvar, Andrej	FRI 08:20
Mrvar, Andrej	FRI 10:40
Muchnik, Lev	SAT 11:00
Mulas, Victor	SAT 09:20
Munson, Jessica	SAT 14:40
Murphy, Philip	SAT 08:40
Murray, Joshua	SAT 16:00
Mustanski, Brian	WED 13:40
Mustanski, Brian	WED 14:00
Mustanski, Brian	WED 15:00
Muth, Stephen	SAT 10:40
Nagle, Nicholas	THUR 15:20
Nagle, Nicholas	SAT 15:00
Namugaya, Faith	THUR 14:40
Natekin, Alexey	THUR 12:00
Neal, Jennifer	THUR 08:20
Neal, Zachary	WED 14:00
Neal, Zachary	THUR 08:20
Neal, Zachary	FRI 11:00
Neal, Zachary	FRI 16:00

Negron, Rosalyn	SAT 16:00
Nelson, Russ	WED 14:00
Nenko, Aleksandra	THUR 11:20
Nenko, Alexandra	THUR 11:00
Neray, Balint	SAT 16:00
Nerghes, Adina	FRI 11:20
Newman, Michelle	THUR 11:00
Ng, Jacqueline	FRI 14:20
Nguyen, Nga	SAT 09:20
Nikolaev, Alexey	SAT 10:40
Nochta, Timea	THUR 08:20
Nurrochmat, Dodik	FRI 14:00
Obayashi, Shinya	FRI 17:30
Öberg, Gunilla	SAT 10:00
Ocelík, Petr	FRI 13:40
Ochieng, Caroline	THUR 15:00
O'Connor, Amy	SAT 16:20
Offer, Shira	THUR 11:20
Offer, Shira	SAT 14:40
O'Hara, Jennifer	THUR 10:40
Okamoto, Janet	THUR 11:00
Okamoto, Janet	SUN 09:20
O'Malley, James A.	THUR 14:00
O'Malley, James	SAT 12:00
O'Malley, Teagen	FRI 17:30
Omar, Farhia	THUR 11:00
Oser, Carrie	FRI 17:30
O'Shea, Susan	WED 15:20
O'Shea, Susan	SUN 08:40
Ouellet, Marie	SAT 14:00
Ozturk, Pinar	SUN 10:40
Pacula, Rosalie	THUR 13:40
Paik, Anthony	FRI 09:40
Paina, Ligia	WED 16:20
Pal, Siddarth	SUN 09:00
Palazzolo, Edward	THUR 13:40
Pallotti, Francesca	THUR 14:40
Pallotti, Francesca	SAT 13:40
Pan, Wei	THUR 09:40
Pandza, Krsto	FRI 14:00
Papachristos, Andrew V.	SAT 11:00
Park, Mina	WED 15:00
Parker, Andrew	FRI 10:40
Pattison, Philippa	THUR 11:40
Payne, Collin	THUR 14:40

Pearce, Matthew	WED 16:40
Pechmann, Connie	SAT 14:00
Peeples, Matthew	SAT 14:00
Penalva-Icher, Elise	THUR 08:40
Penta, Michael	FRI 10:00
Pentland, Alex	THUR 09:40
Peoples, Crystal	FRI 17:30
Perkins, Jessica	THUR 14:40
Perra, Nicola	WED 13:40
Perra, Nicola	THUR 14:40
Perren, Rebeca	WED 15:00
Perry, Brea	FRI 17:30
Perry, Brea	FRI 17:30
Perry, Brea	SAT 11:40
Perry, Brea	SAT 13:40
Perry, Brea	SAT 17:00
Pescosolido, Bernice	SAT 11:40
Petering, Robin	WED 14:20
Petering, Robin	SAT 09:20
Petering, Robin	SAT 15:20
Peterson, Colin	FRI 15:20
Petrescu-Prahova, Miruna	THUR 14:20
Petrova, Liudmila	SUN 08:40
Pfeffer, Juergen	WED 14:00
Pfeffer, Juergen	FRI 08:20
Pfeffer, Juergen	FRI 10:40
Pfeffer, Juergen	FRI 13:40
Pfeffer, Juergen	FRI 15:00
Pfeffer, Juergen	FRI 17:30
Pfeffer, Juergen	SAT 10:00
Pfeffer, Juergen	SAT 14:00
Pfeffer, Juergen	SUN 10:40
Pfeffer, Juergen	SUN 11:00
Philip, Jacques	SAT 14:20
Phillips li, Gregory	WED 13:40
Phillips li, Gregory	WED 14:00
Phillips li, Gregory	WED 15:00
Phillips, Kaye	THUR 11:20
Phillips, Nolan	WED 16:40
Phillips, Nolan	FRI 17:30
Phillips, Nolan	SAT 14:20
Phoa, Frederick	THUR 11:00
Piazza, Anna	SAT 13:40
Piccardi, Carlo	THUR 09:00
Pickering, Trevor	FRI 11:20

Piekenbrock, Matt	FRI 17:30
Pierce, Mario	THUR 09:40
Pihlava, Matti	SUN 09:20
Pike, Susan	SAT 11:20
Pilny, Andrew	SUN 09:40
Pinat, Magali	THUR 14:20
Pisa, Ivan	FRI 14:40
Plaisance, Kathryn S	SUN 09:00
Plouffe, Christopher	WED 15:00
Pollack, Lance	THUR 09:20
Pollard, Michael	FRI 13:40
Pollard, Michael	FRI 14:40
Pon, Julia	WED 16:20
Pontarollo, Nicola	SUN 09:20
Poole, Scott	SUN 09:40
Porter, Mason	SAT 14:20
Porter-Bolland, Luciana	FRI 17:00
Potter, James	SUN 11:00
Potter, James	SUN 11:20
Prescott, Liana	FRI 16:20
Pressler, Daniel	THUR 15:00
Priestley, Yana Maria	FRI 11:00
Priestley, Yana Maria	SUN 09:40
Prochaska, Judith J.	SAT 14:00
Proulx, Jeff	SUN 09:40
Proulx, Jeffrey	SUN 08:40
Pryke, Stephen	SAT 14:40
Puaschunder, Julia	WED 15:00
Pugmire, Juliana	FRI 17:30
Pullen, Erin	FRI 17:30
Pullen, Erin	SAT 11:40
Pullen, Erin	SAT 13:40
Pullen, Erin	SAT 17:00
Punkay, Marc	FRI 14:20
Punkay, Marc	FRI 15:00
Qian, Weining	FRI 17:30
Quan-Haase, Anabel	FRI 17:30
Quercia, Daniele	WED 15:00
Quintane, Eric	SAT 09:40
Quintane, Eric	SUN 11:20
Raabe, Isabel	WED 17:00
Raabe, Isabel	THUR 14:20
Radford, Jason	SAT 10:40
Raeseide, Robert	FRI 11:00
Raeseide, Robert	FRI 17:30

Raeside, Robert	SAT 11:00
Rahn, Rhonda	FRI 15:20
Raman, Roopa	THUR 09:00
Ramanathan, Ram	SAT 10:40
Rambaran, Ashwin	SAT 13:40
Ramirez, Marizen	FRI 09:40
Ramirez, Nayan	SAT 17:00
Ramos Flor, Maria	FRI 15:00
Rank, Olaf	THUR 10:00
Rank, Olaf	FRI 10:00
Rasmus, Stacy	SAT 14:20
Rawlings, Craig	SAT 09:20
Ready, Elspeth	SAT 09:40
Reber, Bryan	FRI 17:30
Reed-Tsochas, Felix	SAT 13:40
Reich, Adam	SUN 09:40
Reisman, Jane	WED 15:20
Reitz, Jeffery G.	FRI 11:40
Retrum, Jessica	THUR 12:00
Rezapour, Rezvaneh	SAT 17:00
Rhoades, Harmony	SAT 15:00
Rhoades, Harmony	SAT 15:20
Rice, Eric	WED 16:20
Rice, Eric	SAT 09:20
Rice, Eric	SAT 10:40
Rice, Eric	SAT 15:00
Rice, Eric	SAT 15:20
Riedl, Christoph	FRI 17:30
Riggs, Paula	SAT 10:40
Rilinger, Georg	FRI 09:40
Rivero Ostoic, Antonio	THUR 11:20
Rizzuto, Tracey	FRI 10:00
Robbins, Christiana	SAT 08:40
Robbins, Matt	SAT 16:20
Roberge, Guillaume	WED 16:00
Roberge, Guillaume	SAT 11:00
Robert, François P.	THUR 10:40
Roberts, John	SAT 14:00
Roberts, Sam G. B.	FRI 08:20
Robins, Garry	WED 17:00
Robins, Garry	THUR 09:20
Robins, Garry	FRI 16:20
Robins, Garry	FRI 17:30
Robinson, Dawn T	SUN 11:00
Roden, Bopha	FRI 09:20

Rodionov, Adil	WED 16:20
Roginski, Jonathan	THUR 13:40
Roginski, Jonathan	SAT 11:40
Rolls, David	WED 17:00
Romolini, Michele	FRI 14:40
Rosenberg, Eli	WED 14:40
Ross, Michael	SAT 10:00
Rossman, Gabriel	FRI 10:00
Rostami, Amir	FRI 17:30
Roth, Adam	FRI 17:30
Roth, Camille	FRI 11:00
Roy, William	FRI 09:20
Ruan, Danching	THUR 15:00
Rudolph, Abby	WED 16:00
Rudolph, Abby	THUR 14:20
Ruducha, Jenny	SUN 11:00
Ruducha, Jenny	SUN 11:20
Ruiz, Guillermo	SAT 09:40
Rus, Andrej	SUN 08:40
Sadri, Arif	THUR 11:40
Saha, Amit	FRI 15:00
Sailer, Kerstin	WED 14:20
Saint-Charles, Johanne	THUR 10:40
Saint-Charles, Johanne	THUR 11:40
Saldivar, Alicia	FRI 17:30
Salonen, Hannu	SUN 09:20
Salwen, Michael	SAT 11:00
Sandberg, John	WED 16:00
Sandberg, John	FRI 17:30
Sandberg, John	SUN 09:00
Sanders-Jackson, Ashley	SAT 14:00
Sandstrom, Ulf	SUN 11:40
Santana, Jessica	FRI 17:30
Sapin, Marlene	SAT 14:40
Sapin, Marlène	THUR 08:40
Sarabi, Yasaman	SAT 10:00
Saramäki, Jari	FRI 08:20
Sari, Intan	FRI 14:00
Satornino, Cinthia B.	WED 15:00
Satornino, Cinthia B.	SAT 10:00
Saxena, Akrati	FRI 09:00
Sayama, Hiroki	FRI 16:00
Sayama, Hiroki	SAT 14:20
Sayre, Eleanor	THUR 11:00
Schaefer, David	WED 14:00

Schaefer, David	WED 15:00
Schaefer, David	FRI 17:00
Schaefer, David	SAT 16:20
Schechter, Esther	SAT 14:20
Schechter, Aaron	WED 16:00
Schechter, Aaron	THUR 09:20
Schifanella, Rossano	WED 15:00
Schloderer, Florian	SAT 10:00
Schneider, John	THUR 09:40
Schneider, John	SAT 10:00
Schneider, John A.	WED 14:20
Schneider, John A.	THUR 08:20
Schoch, David	THUR 11:40
Scholnick, Jonathan	SAT 14:40
Scholten, Lisa	SAT 10:00
Schreier, Claus	SAT 16:00
Schreurs, Bieke	THUR 11:40
Schröders, Julia	SAT 14:00
Schroeder, Rob	SAT 13:40
Schroeder, Robert	SAT 09:40
Schroeder, Robert	SUN 11:20
Schultz, Christian	SAT 14:20
Schulz, Benjamin	THUR 14:20
Schweinberger, Michael	WED 16:20
Scott Poole, Marshall	SAT 14:40
Scott, Lisa	SAT 12:00
Seebaß, Katharina	SAT 15:00
Seegert, Natasha	SAT 09:40
Seipel, Justin	THUR 11:40
Semenov, Aleksandr	THUR 12:00
Semenov, Aleksandr	SUN 10:00
Semenov, Aleksandr	SUN 11:40
Senicheva, Anastasia	THUR 11:20
Sepulvado, Brandon	THUR 11:20
Sepulvado, Brandon	FRI 10:00
Serrano, M.	THUR 15:00
Seršić, Darja	FRI 17:30
Sewell, Daniel	SAT 09:00
Shafie, Termeh	THUR 11:00
Shafie, Termeh	SAT 14:20
Shao, Huajie	SAT 14:40
Shapiro, Dara	FRI 16:20
Shaw, Aaron	SAT 13:40
Shearer, Jessica	THUR 14:40
Shearer, Jessica	SUN 11:40

Shearer, Jessica	SUN 12:00
Sheetz, Lori	FRI 16:00
Sheetz, Lori	SAT 14:20
Shen, Cuihua	FRI 17:30
Shen, Cuihua	SAT 16:00
Shepherd, Hana	FRI 16:00
Sherman, Ledric	FRI 15:20
Shi, Yongren	WED 16:40
Shi, Yongren	FRI 08:40
Shim, Hyoungbo	SUN 09:20
Shimamoto, Daichi	SUN 11:00
Shin, Eun	SAT 08:20
Shin, Heesung	WED 15:20
Shin, Jieun	WED 15:00
Shin, Jung	SUN 10:00
Shiple, Meagan	FRI 15:20
Shirrell, Matthew	FRI 10:40
Shmueli, Erez	THUR 09:40
Shoham, David	SAT 08:20
Shumate, Michelle	WED 17:00
Shumate, Michelle	SAT 16:20
Sidnam, Emily	SAT 08:20
Simms, Rae	FRI 17:00
Simpson, Brent	FRI 10:40
Simpson, Greg	FRI 09:20
Simpson, Sharon	SAT 09:20
Simpson, Sharon Anne	FRI 17:30
Sinatra, Alessandro	SAT 16:40
Singh, Ambuj	SUN 09:00
Singh, Ambuj K.	SAT 13:40
Siqueira, Eduardo	SAT 16:00
Siuki, Helen	FRI 11:20
Skaathun, Britt	WED 14:20
Skinner, Jonathan	THUR 14:00
Skovlund Dissing, Agnete	FRI 17:30
Skvoretz, John	WED 13:40
Slaughter, Andrew	THURS 13:40
Slaughter, Andrew	FRI 16:40
Sloev, Igor	SUN 11:20
Smith, Anna L.	SAT 17:00
Smith, Emily	THUR 15:20
Smith, Emily	FRI 17:30
Smith, Emily	SAT 15:00
Smith, Jana	FRI 17:30
Smith, Jasmine	WED 13:40

Smith, Jeffrey	THUR 15:20
Smith, Matthew	THUR 14:00
Smith, Sanne	SAT 14:00
Smith, Susan	FRI 15:20
Snijders, Tom	FRI 11:00
Soi, Caroline	SUN 11:40
Soller, Brian	FRI 17:00
Song, Eunkyung	FRI 15:00
Song, Lijun	THUR 14:20
Song, Sunmi	FRI 10:40
Song, Yunya	THUR 09:40
Sorbero, Mark	THUR 13:40
Soriano Marcolino, Leandro	SAT 09:20
Soto, Daniel	SUN 10:40
Sowa, Christine	WED 15:00
Sowa, Christine	THUR 12:00
Sperber, Sonja	SAT 16:00
Spillane, James P.	FRI 10:40
Spiro, Emma	WED 14:40
Spiro, Emma	THUR 10:40
Spiro, Emma	FRI 17:30
Spiro, Emma	SAT 09:00
Spiro, Emma S.	FRI 14:40
Spithoven, Andre	SAT 15:00
Sprague-Martinez, Linda	SAT 16:00
Sprong, Sara	THUR 12:00
Spurling, Thomas	FRI 09:20
Squazzoni, Flaminio	FRI 16:00
Stacciarini, Jeanne-Marie	THUR 15:00
Stadtfeld, Christoph	WED 16:20
Stadtfeld, Christoph	SAT 09:20
Stafford, Derek	SAT 12:00
Stammer, Emily	SAT 14:40
Stanton, Patrick	FRI 11:00
Starbird, Kate	THUR 10:40
Starbird, Kate	FRI 14:40
Stefanone, Michael A.	THUR 10:00
Steigenberger, Norbert	WED 14:40
Stein, Brad	THUR 13:40
Steinert-Threlkeld, Zachary	SAT 11:00
Steketee, Michael	SUN 09:20
Sterling, Christopher	SUN 11:00
Sterner, Glenn	FRI 17:30
Stimpson, Matthew	FRI 16:20
Stivala, Alex	WED 17:00

Stivala, Alex	FRI 17:30
Stockman, Jamila	THUR 10:40
Stumme, Gerd	FRI 17:30
Stützer, Cathleen	FRI 17:00
Su, Chunke	FRI 16:20
Sugihara, Keita	SAT 10:40
Suh, Chan S.	WED 16:40
Sullivan, Patrick	WED 14:40
Sun, Yao	SUN 09:40
Sun, Ye	SAT 09:40
Sung, Wookje	FRI 09:00
Sung, Wookje	FRI 17:30
Surkan, Pamela	WED 16:20
Sutton, Jeannette	FRI 17:30
Sutton, Jeannette	SAT 14:20
Swami, Ananthram	SUN 09:00
Swanson, Nathan	FRI 17:30
Sweet, Tracy	THUR 09:00
Syron, Colleen	FRI 17:30
Takes, Frank	SAT 10:40
Takes, Frank	SUN 09:00
Tambe, Milind	SAT 09:20
Tao, Chen-Chao	SAT 16:40
Taylor, Wyatt	THUR 10:00
Teixeira, Fabio	FRI 14:40
Tenenbaum, Josh	THUR 09:40
Terhorst, Andrew	FRI 08:20
Terrell, John	SAT 14:20
Tessone, Claudio Juan	WED 16:40
Thiele, Lisa	FRI 17:30
Thompson, Anja	THUR 14:20
Thompson-Dyck, Kendra	FRI 16:00
Tierney, Alysha	THUR 09:00
Tischer, Daniel	THUR 09:00
Titkova, Vera	THUR 09:00
Titkova, Vera	SAT 16:40
Tobin, Karin	THUR 08:40
Todd, Nathan	SAT 14:20
Todo, Yasuyuki	SUN 11:00
Toll, Alexandra	FRI 17:30
Tolmach, Alexander	SUN 11:40
Tonellato, Marco	FRI 12:00
Toomet, Ott	WED 16:40
Torphy, Kaitlin	THUR 14:00
Townsend, Samuel	FRI 08:40

Toyama, Shigeki	FRI 17:30
Tranmer, Mark	THUR 15:00
Tranmer, Mark	SAT 13:40
Trapido, Denis	THUR 14:40
Trinh, Sarah	FRI 11:40
Trofimov, Mikhail	THUR 12:00
Trujillo, Katherine	THUR 09:00
Tsuji, Ryuhei	FRI 17:30
Tsvetovat, Maksim	FRI 17:30
Tucker, Joan	FRI 14:00
Tucker, Joan	FRI 14:20
Tucker, Joan	FRI 14:40
Tucker, Joan	FRI 15:00
Tucker, Joan	FRI 15:20
Tunnard, Rusty	THUR 09:00
Turkina, Ekaterina	THUR 14:40
Twyman, Marlon	FRI 17:30
Tyshchuk, Yulia	WED 13:40
Ubaldi, Enrico	THUR 14:40
Udomkit, Nuntana	SAT 16:00
Ukkusuri, Satish	THUR 11:40
Unger, Jennifer	SUN 10:40
Upravitelev, Philipp	THUR 12:00
Uzzi, Brian	SAT 14:20
Uzzo, Stephen	FRI 16:00
Uzzo, Stephen	SAT 14:20
Vacca, Raffaele	WED 16:20
Vacca, Raffaele	THUR 15:00
Vacca, Raffaele	FRI 16:20
Vacca, Raffaele	FRI 16:40
Vacca, Raffaele	SUN 11:00
Valeeva, Diliara	FRI 17:30
Valeeva, Diliara	SAT 09:00
Valente, Thomas W.	WED 15:20
Valente, Thomas W.	THUR 09:00
Valente, Thomas W.	THUR 11:20
Valente, Thomas W.	FRI 09:20
Valente, Thomas W.	FRI 11:20
Valente, Thomas W.	FRI 17:30
Valente, Thomas W.	SAT 09:40
Valente, Thomas W.	SAT 14:40
Valente, Thomas W.	SUN 10:40
Van Assche, Ari	THUR 14:40
van den Besselaar, Peter	SUN 11:40
Van den Bossche, Piet	THUR 11:00

van der Lippe, Tanja	THUR 08:40
van Duijn, Marijtje	SAT 13:40
van Gerwen, Nikki	THUR 08:40
van Gerwen, Nikki	FRI 09:40
van Tubergen, Frank	FRI 11:20
Vanhoof, Jan	THUR 11:00
Varda, Danielle	THUR 11:00
Varda, Danielle	THUR 11:40
Varda, Danielle	THUR 12:00
Vardavas, Raffaele	FRI 17:30
Veenstra, Rene	SAT 13:40
Vega Yon, George	FRI 09:20
Veksler, Vladislav	SAT 14:40
Venkatesh, Alladi	THUR 09:20
Ventriss, Curtis	FRI 14:40
Verdery, Ashton	SAT 11:20
Verma, Jennifer	THUR 11:20
Very, Philippe	WED 14:40
Vespignani, Alessandro	THUR 14:40
Vest Ettekal, Andrea	SAT 16:20
Vezzani, Alessandro	THUR 14:40
Vinton, Kami	FRI 16:20
Vladimirova, Alina	SUN 09:00
Vlaemynck, Marieke	FRI 15:00
Vlegels, Jef	SAT 15:00
Vogel, Mia	THUR 09:00
von Grundherr, Michael	SAT 16:40
Vu, Thuy	THUR 14:20
Vulturius, Gregor	THUR 15:00
Wagner, Karla	THUR 10:40
Wagner-Pacifici, Robin	SUN 11:00
Waiswa, Peter	THUR 14:40
Waldstrøm, Christian	FRI 17:30
Walls, Logan	THUR 10:40
Walsh, Coleen	FRI 17:30
Wang, Bo	THUR 14:40
Wang, Cheng	SAT 08:40
Wang, Cheng	SAT 14:00
Wang, Dan	FRI 16:40
Wang, Jia	THUR 09:40
Wang, Lan	SAT 11:00
Wang, Lisha	SAT 14:40
Wang, Peng	WED 17:00
Wang, Peng	THUR 11:40

Wang, Peng	FRI 09:20
Wang, Peng	FRI 10:40
Wang, Peng	FRI 16:20
Wang, Peng	SAT 10:00
Wang, Rong	WED 16:00
Wang, Rong	SUN 08:40
Wang, Tai-Chi	THUR 11:00
Wang, Yuehan	WED 13:40
Wang, Zhizhang	THUR 14:00
Wanjiru, Hannah	THUR 15:00
Wasserman, Yulia	SUN 12:00
Watling Neal, Jennifer	THUR 09:40
Watson, Joe	FRI 09:00
Webster, Cynthia	FRI 11:20
Weeks, Margaret	THUR 09:00
Welch-Lazoritz, Melissa	FRI 17:30
Wellman, Barry	FRI 11:40
Wellman, Barry	FRI 17:30
Wenzel, Suzanne	SAT 15:00
Whalen, Ryan	SUN 09:20
Whetten, Kathryn	FRI 14:40
Widdop, Paul	WED 15:20
Wilberg, Julian	FRI 17:30
Wilberg, Julian	SAT 09:20
Williams, Malcolm	THUR 11:00
Williams, Mark	SAT 10:00
Williams, Trefor	SAT 14:00
Wilson, Christo	THUR 10:00
Wilson, James	SUN 11:40
Wilson, Whitney	WED 17:00
Winetrobe, Hailey	SAT 15:00
Winetrobe, Hailey	SAT 15:20
Winkelman, Zev	FRI 17:30
Wipfli, Heather	FRI 09:20
Withers, Michael	SUN 09:40
Woehler, Meredith	THUR 10:00
Woehler, Meredith	FRI 09:00
Wolf, Christof	THUR 08:40
Wolf, Miriam	FRI 14:00
Park, Han Woo	THUR 09:40
Wood, Brian	SAT 16:20
Wood, George	SAT 11:00
Wood, Mike	SAT 11:40
Wright, Eric	FRI 17:30
Wright, Eric	SAT 13:40

Wright, Eric	SAT 17:00
Wu, Xin-Zeng	SAT 08:40
Wurpts, Bernd	THUR 09:00
Wurpts, Bernd	THUR 09:20
Wyman, Peter	FRI 11:20
Xavier Gomez-Olive, Francesc	THUR 14:40
Xiang, Weihua	FRI 09:00
Xiao, Han	SUN 09:20
Xu, Ran	WED 14:20
Xu, Yu	WED 16:40
Yadav, Amulya	SAT 09:20
Yahja, Alex	SAT 14:40
Yan, Xiaoran	SAT 08:40
Yang Tan, Bing	SAT 14:20
Yang, Aimei	WED 16:00
Yang, Jae-Suk	FRI 08:40
Yap, Janice	SAT 09:00
Yap, Janice	SAT 14:20
Yen, Tso-Jung	THUR 08:40
Yetz, Neil	FRI 17:30
Ying Mo, Guang	FRI 11:40
Yoo, Minju	SUN 09:00
Yoshioka -Maxwell, Amanda	WED 14:20
Yoshioka-Maxwell, Amanda	WED 16:20
Yoshioka-Maxwell, Amanda	SAT 15:20
Young, April	WED 14:20
Young, April	WED 16:00
Young, April	THUR 14:20
Young, Jacob	WED 14:00
Young, Jacob	FRI 17:00
Young, Lindsay	THUR 09:40
Young, Lindsay E.	THUR 08:20
Yousefi-Nooraie, Reza	FRI 13:40
Yu, Andrew	WED 16:20
Yu, Janie	FRI 16:40
Yu, Jia	FRI 17:30
Yu, Ruoh-Rong	THUR 14:20
Yu, Yue	FRI 17:30
Yuan, Ying	FRI 17:00
Yudkevich, Maria	SAT 09:00
Zakhlebin, Igor	SUN 10:00
Zakhlebin, Igor	SUN 11:40
Zappa, Paola	THUR 09:20
Zappa, Paola	FRI 11:20
Zelenev, Alexei	THUR 09:00

Zelenev, Alexei	SAT 08:20
Zeng, Li	FRI 14:40
Zerubavel, Noam	SUN 09:40
Zhang, Guodong	WED 16:40
Zhang, Guodong	THUR 14:00
Zhang, Lily	THUR 10:40
Zhang, Mo	THUR 10:40
Zhang, Qian	WED 13:40
Zhang, Xuhong	FRI 09:20
Zhao, Jun	SUN 11:00
Zhao, Wanli	WED 16:40
Zhao, Wanli	THUR 14:00
Zheng, Julia	THUR 09:40
Zhiming Xu, Larry	FRI 17:30
Zhu, Mengxiao	THUR 10:40
Zimmer-Dauphinee, James	SAT 14:20
Zinoviev, Dmitry	FRI 08:20
Žnidaršič, Anja	THUR 11:40
Žnidaršič, Anja	THUR 12:00
Zorbach, Thomas	WED 14:00
Zutz, Clare	SUN 09:00

Recommendations for Eating, Drinking, and Going Out

\$ bargain / casual
\$\$ mid-priced
\$\$\$ upscale / fancy

FASHION ISLAND RESTAURANTS (across the street from the hotel)

Blaze Fast-Fire'd Pizza (\$)

Great build-your-own pizza and salads.
Open for lunch and dinner.
401 Newport Center Dr
Ph. (949) 706-0160
www.blazepizza.com

Pain Du Monde (\$\$)

Casual and fresh bakery and café.
Open for breakfast, brunch and lunch.
561 Newport Ctr Dr
Ph. (949) 644-4835

hopdoddy burger bar (\$\$)

Cool Texas transplant burger bar with craft beer and wine. Open for lunch and dinner.
401 Newport Center Dr. #311
Ph. (949) 640-2337
<http://www.hopdoddy.com/>

CUCINA enoteca (\$\$)

Local and seasonal Californian products, with large alfresco patio, spacious bar area and intimate table settings.
Open for lunch and dinner.
951 Newport Center Dr
Ph. (949) 706-1416
www.urbankitchengroup.com/cucina-enoteca-newport-beach/

R + D Kitchen (\$\$)

Southern Californian, burgers and salads.
Great bar. Open for lunch and dinner.
555 Newport Ctr Dr
Ph. (949) 219-0555
<http://rd-kitchen.com/locations/newportbeach/>

True Food Kitchen (\$\$)

Trendy Southern Californian fresh vegetarian and vegan. Open for lunch and dinner.
451 Newport Center Dr
Ph. (949) 644-2400
www.truefoodkitchen.com

Yard House (\$\$)

American sports bar with great selection of beers and good happy hour.
Open for lunch, dinner, and drinks.
849 Newport Center Dr
Ph. (949) 640-9273
www.yardhouse.com/locations/ca/newport-beach/newport-beach-fashion-island/8317

Sushi Roku (\$\$\$)

Upscale sushi restaurant with dim, boisterous vibe, full bar, and patio.
Open for lunch and dinner.
327 Newport Center Drive
Ph. (949) 706-3622
www.innovativedining.com/restaurants/sushi-roku

Roy's Restaurant (\$\$\$)

Upscale modern seafood restaurant, featuring "Aloha Hour" at the bar.
Open for dinner only.
453 Newport Center Dr
Ph. (949) 640-7697
www.roysrestaurant.com

Red O (\$\$\$)

Upscale modern Mexican, seafood, and steak.
Open for lunch and dinner.
143 Newport Ctr Dr
Ph. (949) 718-0300
www.redorestaurant.com

Fleming's Prime Steakhouse & Wine Bar (\$\$\$)

Upscale steak house with award winning wine list.
Open for dinner only (lunch on Sunday),
455 Newport Center Dr
Ph. (949) 720-9633
www.flemingssteakhouse.com

NEWPORT BEACH RESTAURANTS

Picante Martin's Mexican Restaurant (\$)

Great taqueria serving breakfast (and breakfast burritos), lunch and dinner.

320 Marine Ave, Ste B,
Newport Beach, CA 92662
Ph. (949) 675-4627

Rose Bakery Café (\$)

Breakfast and brunch, coffee, fresh donuts, and deli. Open for breakfast and lunch.

3536 E Coast Hwy, Ste C,
Corona del Mar, CA 92625
Ph. (949) 675-3151

www.rosebakerycafe.net

Patty Macs (\$)

Charming surf-style diner serving sandwiches, salads, seafood, and mac & cheese.

Open for lunch, dinner and happy hour.

209 Palm St, Newport Beach, CA 92661

www.pattymacsrestaurant.com

Crocker's The Well Dressed Frank (\$)

Burgers, hot dogs, clam chowder and other American delights.

Open for lunch and dinner.

211 Marine Ave, Ste A,
Newport Beach, CA 92662
Ph. (949) 572-9293

Pizzeria Saponi (\$\$)

Casual place for with wood-fired pizzas, Italian entrees, and pasta. Rave reviews. Open for dinner.

1080 Bayside Drive, Newport Beach CA
Ph. 949-644-4220

www.saporinb.com/

Juliette Kitchen + Bar (\$\$)

Modern seasonal Californian fare, with sandwiches, salads, small plates and share plates.

Open for lunch, dinner, and cocktails.

1000 Bristol St. #11, Newport Beach

Ph. 949-752-5854

www.juliettenb.com/

The Beachcomber (\$\$)

Beautiful beachside restaurant with modern seafood and American dishes, and great cocktails.

Open for breakfast, lunch and dinner.

15 Crystal Cove, Newport Coast, CA 92657

Ph. (949) 376-6900

www.thebeachcombercafe.com/_crystalcove/index.aspx

San Shi Go (\$\$\$)

Upscale Japanese and sushi.

Open for dinner.

205 Main St. Newport Beach, CA 92661

Ph (949) 673-3724

www.okidoki345.com

BARS

Wild Goose Tavern

436 E 17th St., Costa Mesa, CA 92627

<http://www.goosebar.com/>

Stag Bar + Kitchen

121 Mc Fadden Pl.,

Newport Beach, CA 92663

<http://stagbar.com/>

Cassidy's Bar & Grill

Dive bar, pool tables, burgers.

2603 Newport Blvd, Newport Beach, CA

www.facebook.com/Cassidys-Bar-Grill-79128552008/

Wine Gallery

2411 E Coast Hwy, Suite 250,

Corona Del Mar, CA 92625

<http://winegallerycdm.com>

LIVE MUSIC

The Wayfarer

843 W 19th St., Costa Mesa, CA 92627

<http://www.wayfarercm.com/>

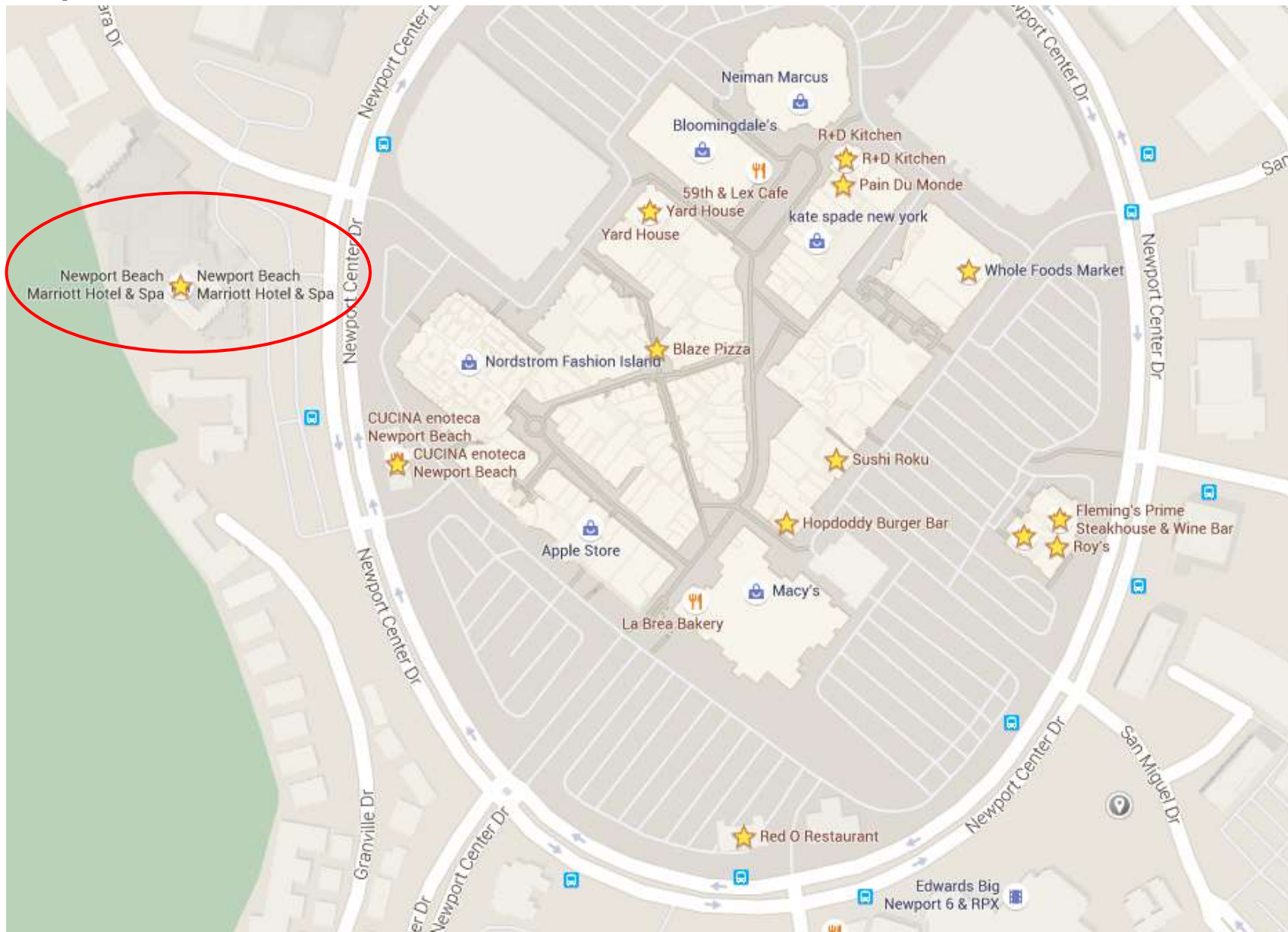
Casa

Cocktails, jazz and blues.

820 W 19th St, Costa Mesa, CA 92627

<http://casacostamesa.com/>

Map of Fashion Island Restaurants



International Sunbelt Social Network Conference History

No	Year	Location	Keynote Speaker	Organizers
I	1981	Tampa	None	H. Russell Bernard & Alvin Wolfe
II	1982	Tampa	John Barnes	H. Russell Bernard & Alvin Wolfe
III	1983	San Diego	James Coleman	Douglas White
IV	1984	Phoenix	Harrison White	Brian Foster
V	1985	Palm Beach	Linton Freeman	H. Russell Bernard & Alvin Wolfe
VI	1986	Santa Barbara	J. Clyde Mitchell	Eugene Johnsen & John Sonquist
VII	1987	Clearwater	Everett M. Rogers	H. Russell Bernard & Alvin Wolfe
VIII	1988	San Diego	Charles Kadushin	John Sonquist, Eugene Johnsen, Sue Freeman & Linton Freeman
IX	1989	Tampa	Frank Harary	Jeffrey Johnson
X	1990	San Diego	Mark Granovetter	Everett M. Rogers
XI	1991	Tampa	James Davis	Katie Faust, Jeffrey Johnson, John Skvoretz & Alvin Wolfe
XII	1992	San Diego	Peter Blau	Phillip Bonacich & Sue Freeman
XIII	1993	Tampa	A. Kimball Romney	H. Russell Bernard & Alvin Wolfe
XIV	1994	New Orleans	Barry Wellman	Scott Feld & Jill Sutor
XV	1995	London	Patrick Doreian	Martin Everett & Keith Rennolls
XVI	1996	Charleston	Bonnie Erickson	Katie Faust & John Skvoretz
XVII	1997	San Diego	H. Russell Bernard & Peter Killworth	Pat Doreian & Sue Freeman
XVIII	1998	Sitges	Rolf Zeigler	José Luis Molina, Josep Rodríguez, Nuria Ávila, Frans Stokman, Tom Snijders, Evelien Zeggelink, Stephen Borgatti, Alain Degenne & Thomas Schweizer
XIX	1999	Charleston	Nan Lin	John Skvoretz & Katie Faust
XX	2000	Vancouver	Linton Freeman	Bill Richards & Andrew Seary
XXI	2001	Budapest	Martin Everett	Endre Sik
XXII	2002	New Orleans	Philippa Pattison	Ruth Aguilera, Noshir Contractor, Scott Feld, Caroline Haythornthwaite, Shin-Kap Han, Ravi Madhavan & Stan Wasserman
XXIII	2003	Canção	Alvin Wolfe	Jorge Gil-Mendieta, Narda Alcántra, Silvia Casasola Vargas, Jorge Castro Cuellar, Alejandro Ruiz León, José Luis Molina, Samuel Schmidt & Enrique Pérez Garcia

International Sunbelt Social Network Conference History

No	Year	Location	Keynote Speaker	Organizers
XXIV	2004	Portorož	Frans Stokman	Anuška Ferligoj, Vladimir Batagelj, Andrej Mrvar, Hajdeja Iglič, Andrej Rus, Gregor Petrič, Tina Kogovšek, Matjaž Zaveršnik, Nataša Kejžar & Darinka Kovačič
XXV	2005	Redondo Beach	Ronald Breiger	Carter Butts, Rebecca Davis, Katherine Faust & Tom Valente
XXVI	2006	Vancouver	Ed Laumann	Bill Richards
XXVII	2007	Corfu	Vlado Batagelj & Anuška Ferligoj	Moses Bourdoudis & Losif Botetzagias
XXVIII	2008	St. Pete Beach	Stephen Borgatti	John Skvoretz, H. Russell Bernard, Christopher McCarty & Mark House
XXIX	2009	San Diego	Phillip Bonacich	Rebecca Davis, Laura Koehly & Tom Valente
XXX	2010	Riva del Garda	Tom A. B. Snijders	Mario Diani, Ferenc Jordan, Francesca Odella, Elena Pavan, Massimo Riccaboni, Alberto Sanna, Marco Zamarian, Francesca Menna
XXXI	2011	St. Pete Beach	Kathleen Carley	John Skvoretz, H. Russell Bernard, Christopher McCarty & Mark House
XXXII	2012	Redondo Beach	David Krackhardt	Laura Koehly, Rebecca Davis & Tom Valente
XXXIII	2013	Hamburg	John Padgett	Betina Hollstein, Sonja Drobnič, & Michael Snegg
XXXIV	2014	St. Pete Beach	Jeff Johnson	H. Russell Bernard, Christopher McCarty & John Skvoretz
XXXV	2015	Brighton	Tom Valente	Elisa Bellotti, Bruce Cronin & Martin Everett
XXXVI	2016	Newport Beach	Garry Robins	Kayla de la Haye, Rebecca Davis, Tom Valente, Hank Green & Kate Coronges

XXXVI International Sunbelt
Social Network Conference
Presentation and Poster Abstract

INSNA

*Newport Beach, CA
April 5 to April 10, 2016*

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Oral presentation abstracts

Collaborations and Careers: Disentangling Quality Signaling from Collective Skill Formation in the Theater and Movie Industries

Fabien Accominotti (LSE)

This paper examines the social underpinnings of success and inequality by disentangling the various mechanisms - collective skill formation, relational quality signaling, and social capital accumulation - whereby collaborations shape the subsequent course of individual careers. The project builds on a unique administrative record of labor contracts in the French theater and motion picture industries from 1986 to 2005 to reconstruct the collaboration networks between artistic performers over that twenty-year period. Critically, these data report the actual time performers spent together on the stage or movie set, which I use as an indicator of collective skill formation. By exploiting the discrepancy between time spent together and mere common presence in the credits of a movie or theater play, I am able to parse out the impact, on subsequent earnings and employment, of respectively reputation effects and collective skill formation - a feat rarely achieved in the literature on collaborations and careers. After adjusting for various controls, I show that collaborations with successful others positively impact subsequent career steps through a quality-signaling mechanism, or credits effect. Yet it is time spent with not-so-established others that lifts further earnings through a skill formation process, probably because these others are the ones that are able to impart fresh skills. Thus, the paper does not only show that collaborations matter for individual achievement: it also unpacks which collaborations matter, and how they do so.

Dissolution and Re-Activation in Collaboration Networks

Jimi Adams (University of Colorado Denver), Ryan Light (University of Oregon)

Collaboration networks are frequently used to estimate characteristics of tie accumulation, relationship clustering, and network change/stability over time. Moreover, collaborations—along with citations and research content—often form the backbone(s) for interpreting field-level dynamics in a variety of applications, including: disciplinary trajectories, interdisciplinary dynamics, and team science. A key limitation in much of the prior collaboration network literature is that ties are simply assumed to accumulate over time (ignoring the ebbs and flows in those relationships), which treats all ties as perpetually manifest. This stands in contrast to recent theoretical developments for analyzing network dynamics, which have identified the important difference between dynamics of networks (how ties change over time) versus dynamics on networks (how network change functions as an independent variable shaping other outcomes). This distinction has shaped methodological examination of network dynamics, in practice treating dynamics of networks independently from the dynamics on networks. Yet, collaboration ties are both the consequence of dynamic process and directly how influence networks change.

As such, we need to formalize a framework to understand and predict collaboration network dynamics. Here, we therefore ask two specific sets of questions about collaboration ties. First, we ask what leads a collaborative relationship to dissolve. We describe the distribution of these collaborative dissolutions, and provide some initial estimates of their attribute- and homophily-based predictors (based on characteristics such as, gender, age, and institution prestige). This first set of questions leads to another key feature of collaboration networks—the latent potential for their subsequent re-activation from this dormant phase. Therefore, second we ask about this latent period, in a manner that parallels the first set of questions: we describe, then estimate initial predictors for this dormancy and reactivation process. Across both questions, we particularly focus on the differences between mentor/mentee relationships compared to other (less formalized) collaborative relationships. We examine these questions with data covering the years 1975-2003 which combines scientometric data from Sociological Abstracts with membership data from the American Sociological Association for 1,322 authors.

From Social network to Social network: Social Pricing model for emerging markets Telecoms customers

Olubayo Adekanmbi (City University, London)

Pricing has been applied as a dynamic tool for competitiveness in the telecoms industry, especially in emerging market where revenue is threatened by higher share of low-income customers, macroeconomic pressure and high multisimling

(use of multiple SIMs for price arbitrage). Traditional pricing models are largely driven by cost and utility, with new trends like yield management and location-based discounts being applied to drive market penetration and profitability in the low income segment.

Emerging market customers, especially those in West and Central Africa are collectivist societies where interpersonal ties define the organic solidarity of their communal culture. The nature of interactions between these social cliques and the ability to leverage these relational cliques to keep trigger telecoms services usage and sustain longer customers' activity ratio using special preferential in-community tariff have been evaluated in this study. The social capital theory of the cumulative benefits that flow from the trust, reciprocity, information, and cooperation associated with social networks has been applied to build a social pricing framework; where dynamic, personalised and regressive pricing can be applied to stimulate customers to make additional calls to their social cliques based on the perceived value attached to the social network. This dynamic model of network-based social pricing is significantly different from the generic friends-and-family tariffing principles.

This methodology seeks to provide an alternative to telecommunication operators' profitability drive by combining the ability to sustain customers' activity ratios via more frequent contact with their social ties at discounted rates (customer retention) and the dynamic ability to recommend further discounts for less-frequently called phone numbers within customers' sphere of influence (unique list of previously called numbers in the last two years). In monetising the strength of the interactions and likely incremental spend, learning from Krackhardt's "philo" relationship was applied to score the various relational bridges and social ties using Interaction (frequency of return calls and/or SMS exchange), Affection (average length of call compared to market average) and Time (recency and history of interaction counted in months). This scoring model was applied to develop a Call Recommender system to stimulate social calling at low-peak periods through a personalised USSD campaign interface (e.g. Call this friend's number 1234 in the next one hour at 90% discount). After 6 months of targeted campaigns, 6% uplift in revenue was observed in a 50,120 sample used for this study compared to an untreated cohort. In the same vein, the churn or customer inactivity ratio in the treated group outperformed benchmark models significantly with a 31% positive difference between the treated and non-treated groups.

This study has opened a new frontier in how telecommunication operators in emerging market can effectively operationalise a dual strategy of customer retention and incremental revenue through social network optimisation and dynamic social pricing model, executed using legacy campaign management system.

Biased-Net-type centrality measure(s): Using a probabilistic version of walks, trails and paths to specify central actors in a network

Filip Agneessens (University of Surrey)

Measures of individual centrality for an actor (i) in a network are often obtained by aggregating the connections between the focal actor (i) and all its direct and indirect connections to others (k) in this network. The level to which there is a connection between an actor (i) and others (k) will be dependent on the choice of trajectories that are allowed, i.e. the way resources from actor (i) can flow through the network in order to reach these others (k). Borgatti (2005) has focused on four such types of trajectories: walks, trails, paths and geodesics. Trails are specific types of walks where the same edge cannot be passed multiple times in a specific trajectory, whereas paths are specific types of trails where the same nodes cannot be passed multiple times in a specific trajectory. However, such restrictions do not have to be binary (i.e. the same edge or node can or cannot be passed), but instead can be probabilistic (i.e. it is less or more likely that the same edge or node is passed). Moreover these restrictions might be more or less relevant when the edge or node is revisited after a short versus long number of intermediary steps (resulting in more local versus more global restrictions). An approach based on Rapoport's biased net procedure is used to model such restrictions. The impact of the choices of (levels of) restrictions for nodes in specific networks. Both situations where resources are duplicated and transferred (Borgatti, 2005) will be considered.

Consumer Ties in Social Media Networks

Duygu Akdevelioglu (University of California, Irvine), Alladi Venkatesh (University of California, Irvine)

Obesity and obesity related health problems are tremendous concerns since two thirds of Americans are considered overweight. Understanding fitness networks and fitness culture is important since it can offer solutions to these

societal level issues. This study provides an in-depth analysis of structural patterns in consumption relationships that take place in social media networks give a unique setting and a good starting point to help us explicate the strength of consumer ties. This research investigates the relationship between strength of consumer ties and goal attainment. Recent research suggests we should take a closer look at social media that facilitate and enhance networks of individuals (Dijck 2012, Christakis and Fowler 2009). Cultural underpinnings of tie strength and the effect of consumer ties on consumer compliance and goal attainment has not been explored in depth in consumer communities literature. This research will explain how and why consumer ties in social media networks are important in consumer compliance, goal attainment and consumer satisfaction. This study provides important insights about how tie strength and consumer compliance leads to goal attainment and satisfaction. We hypothesize that the more the consumer tie strength is, the greater is the consumer's compliance with the fitness community, hence has greater goal attainment and satisfaction with the fitness product (i.e., pedometer).

The setting for this study is online consumer communities, specifically, fitness networks on Facebook. The data have three parts: in-depth interviews, survey and social networks data extracted from Facebook. Participants will be the members of consumer fitness networks (i.e., Facebook groups). Consumer tie strength will be assessed through total number of likes a consumer receives on a "post" which is a status update, photo with or without text, video, or share. The data consist of one mode projection of multiple two-mode social networks. The actors are people who are members of Facebook groups. The relationship between the actors is defined with 'liking', which stands for the number of times two actors 'liked' the same post. In addition, in our questionnaire (survey), we will be measuring consumer compliance, goal attainment, and satisfaction with the community and the fitness product. Hence, the proposed research also makes a public policy and societal contribution, adding to our overall understanding, as consumers, researchers and marketers, of social media networks, a powerful and increasingly important context for relationships.

Adolescents' antipathy networks: does migration history and minority status matter?

Daniel Alexandrov (Higher School of Economics - St.Petersburg), Vera Titkova (Higher School of Economics - St.Petersburg), Valeria Ivaniushina (Higher School of Economics - St.Petersburg)

Negative relations constitute an important part of adolescent social ties. There are many studies of inter-ethnic friendships, but studies of negative ties are scarce - notable exception is research by Hungarian scholars in RECENS group - see recent publication (Boda and Neray, 2015). Our data was collected in 49 schools of Great Moscow area: 180 classroom networks and 3000+ students (50% girls, 12% ethnic minority). Two name generators were used: "With whom you socialize most of all?" and "With whom you socialize least of all?" We use ERGM models on separate classrooms and consequent meta-analysis. Our previous research was focused of positive relations in multi-ethnic classes (Ivaniushina, Alexandrov, 2012). We found that ethnic majority students nominates minority as often as they nominate majority taking into account the opportunity structure in respective classes. Students of ethnic minority, on the contrary, prefer to make friends with minority. These results are in consistence with the findings in Europe (for example, Vermeij, van Duijn M, Baerveldt , 2009). In this paper we analyze the relationship between minority status, migration history and negative relations in classroom. Based on our previous results we hypothesize that (1) minority status does not increase probability of negative nominations; (2) migration history affects negative ties, i.e. recently arrived students are more likely to receive negative nominations; (3) there is equal probability of same-gender and cross-gender negative nominations.

Exploring ISIL Cyber Network Activities: Evolution, Means, and Strategies

Samer Al-Khateeb (University of Arkansas at Little Rock), Muhammad Hussain (University of Arkansas at Little Rock), Nitin Agarwal (University of Arkansas at Little Rock)

From the terrorist attacks in Paris to the mass shooting in San Bernardino, California, the Islamic State's (known as ISIL or ISIS) dangerous influence is increasing and sadly threatening the life of many innocent people. ISIL's digital influence in social media is extraordinary. In today's interconnected world, terrorist groups and transnational crime organizations such as, ISIL use strategic and tactical information maneuvers on social media, especially Twitter, to recruit, radicalize, raise funds, and coordinate attacks. This led to an increase in the number of supporters of this group online and on the ground. President Obama described ISIL as "killers with good social media" who recruit in "far flung" places. Due to the increasing danger caused by ISIL globally and in the USA specifically, there is a need

to rigorous study and analysis of this group behavior, network evolution, means they use to spread their propaganda messages, and the strategies they follow. Various efforts conducted by the U.S. State Department's social media program, "Think Again, Turn Away" or vigilante and "hacktivist" groups such as "Anonymous" are trying to counter ISIL's online narratives or disrupt their online influence. Though the efforts are well intentioned, these are yet far from accomplishing the mission. In this ONR-funded research, we develop social science-driven methodologies on five Twitter datasets that we collected for the various heinous acts conducted by ISIL. We extracted the social network (agent-agent network) for the top 10 ISIL propaganda disseminators mentioned in a report released by the International Center for the Study of Radicalization (ICSR) then studied their network evolution during a period of 6 months. The powerful and/or emergent leaders of the group were identified. Although a lot of accounts were suspended by Twitter many more were added by ISIL top sympathizers to recover their network. Many accounts were attacked by "Anonymous" while others were captured in different places around the world. Furthermore, we extracted the communication network (agent - knowledge network) during the three different beheading propaganda videos shared in 2015, i.e., the beheading of Egyptian Copts, the Arab-Israeli "Spy", and the Ethiopian Christians. Studying these networks helped identify powerful and emergent leaders of the group that participated in propaganda dissemination for multiple beheading and mass killing events. We applied our previously published computational social network analysis technique, focal structure analysis (FSA) to identify influential groups of users or powerful groups that possess the ability to effectively coordinate cyber propaganda campaigns (in this case ISIL's). Also noted was the exploitation of botnets (computer programmed agents capable of posting large number of tweets in a very short time) in dissemination of ISIL's propaganda on Twitter, indicating a highly technology savvy ISIS supporter base. Additionally, we use cyber-forensic techniques to discover the otherwise hidden blogs, websites and metadata (such as IP addresses, phone numbers, email addresses and physical locations), contributing to the open source intelligence gathered from our studies, which is then forwarded to the U.S. National Geospatial Intelligence Agency and other U.S. defense analysts for assisting policy-level decision making

Personal Network Structures in Activity-based Online Social Networks

Zack Almquist (University of Minnesota), Emma Spiro (University of Washington)

Prior research has demonstrated that social influences can affect collective health outcomes, however, research on social dynamics in the context of such behaviors, for example exercise or eating habits, is still in its infancy. Here, we use data from the platform Strava, an online social network designed to promote increased activity and fitness as a result of peer to peer interaction, digital badges, and data-driven engagement, to explore differences in personal network structure among users. In particular we investigate activity-based assortative mixing, describing the extent to which specific groups (e.g., runners, professional athletes, etc.) of users show homophilous social ties. Our results have important implications to the work on social influence mechanisms and network-based interventions which utilize network processes to promote or contain certain behaviors or actions in a population.

Social networks of youth and young adults who misuse prescription opioids and heroin

Alia Al-Tayyib (Denver Public Health), Stephen Muth (Quintus-ential Solutions), Eric Rice (University of Southern California), Paula Riggs (University of Colorado School of Medicine)

Aim: The intertwining prescription opioid and heroin epidemics are a significant public health problem in the United States. We sought to describe an approach to recruit and assess the networks of youth and young adults who are currently misusing prescription opioids or have transitioned to heroin use after a period of prescription drug misuse.

Methods: Persons between the ages of 15 and 24 were recruited using respondent-driven sampling (RDS), a peer-referral sampling methodology. In RDS, initial seed participants are identified through key stakeholders and outreach efforts and are recruited for participation. Seeds use referral coupons to recruit persons from their networks, who in turn use coupons to recruit others from their networks, and so on. Persons were eligible to participate if they were currently misusing prescription opioids or were currently using heroin after a period of prescription opioid misuse. Participants completed an interviewer-administered behavioral survey and were offered rapid tests for both HIV and hepatitis C virus infections. In addition, participants completed a social network assessment. The social network assessment combined two interviewer-administered approaches: completion of a pre-numbered list form to enumerate alters and to capture alter attributes and behaviors; and a participant-aided sociogram to capture respondent report of interactions between alters. Participants were prompted to think about persons who were involved in their life in

a significant way during the past month. Participants were asked to report on social support characteristics as well as drug use behaviors of persons in their networks.

Results: Data collection began October 1, 2015. As of December 21, a total of 14 seeds and 12 referrals have participated. These 26 participants provided network information on 194 unduplicated network members. Recruitment is ongoing and we anticipate being able to report findings on an estimated 120 participants for the April meeting.

Conclusions: Thus far, augmenting RDS with an enumeration of participants' social network appears to have the potential to provide rich contextual data to help elucidate the complex issue of prescription opioid misuse and transition to heroin.

Towards typologisation in qualitative network analysis

Alice Altissimo (University of Hildesheim), Andreas Herz (University of Hildesheim)

In qualitative research, the construction of typologies is of major importance. Generally, researchers build up typologies by identifying dimensions for comparisons based on relevant categories and by then grouping the cases according to the differences and similarities regarding these categories. However, dealing with qualitative network data - meaning both data from narrative interviews and qualitative network maps - the process of typologisation raises several questions in the analysis: The construction of a typology may treat interviews and network maps as A) co-dependent cases or B) independent or distinct cases. In situation A), the combination of an interview and a network map form one case (interview + map = case). In situation B) dimensions deduced from all the interviews are either compared amongst each other, independently of the dimensions taken from the maps (within-interviews, within-maps). Or the focus lies on the analysis of dimensions based on categories taken from network maps and interviews not following a strict case logic. To sensitize for the peculiarities in the typologisation based on qualitative network data and illustrate ways to handle them, we use data on personal networks from a current study on transnational youth mobility within Europe. Data collection was performed using qualitative ego-centric network maps ("concentric circles") combined with qualitative interviews.

Game Theory and Network Models for the Reconstruction of Networks

Viviana Amati (Department of Computer and Information Science, University of Konstanz), Ulrik Brandes (Department of Computer and Information Science, University of Konstanz)

Game-theoretic models have been recently used to link the global configuration of a network to the micro-level mechanisms governing the occurrence of ties and to develop and test theories that may explain a network's formation. This game-theoretic interpretation may be relevant to reconstruct partially observed networks when theories and propositions concerning the creation and termination of ties are provided and used to infer missing ties. Here, we show how to use these propositions and game-theoretic concepts to specify dynamic strategic games for the reconstruction of networks. Given an interaction framework, designed as a game where actors take decision in an attempt to maximize their utility, we suggest to use stable networks as plausible network reconstructions. To illustrate the applicability of this approach we consider networks of interaction between past cultures and communities, for those archaeological evidence and historical documentation provide only fragmentary information. In particular, we consider pre-colonial (period AD 100-400) Caribbean networks.

Dynamics of Collective Performance in Collaboration Networks

Victor Amelkin (University of California, Santa Barbara), Omid Askarisichani (University of California, Santa Barbara), Young Ji Kim (Massachusetts Institute of Technology), Ambuj K. Singh (University of California, Santa Barbara), Thomas W. Malone (Massachusetts Institute of Technology)

When designing a team, whether it is an agile software development group or a squad of soldiers, the key question is how well the prospective team will perform. In our work, we analyze the performance of small groups of collaborating humans on a range of simple tasks—involving brainstorming, judgement, memorizing, puzzle-solving, and psychomotor activities—and study its connection with individual-, group-, and network-level features of these teams. The individual-level features include cognitive abilities, such as social perceptiveness—the ability to recognize a person's mental states—and personality traits, such as extraversion vs. introversion. The group-level features include gender

diversity, and collective intelligence, that, analogously to IQ for individuals, measures how well a group performs, as a single entity, on a wide variety of tasks. Finally, the log of interactions between team members implicitly defines the team's social network.

Given the teams and their performance scores, our goals are to explain the teams' collective performance in terms of their features; analyze the temporal dynamics of collective intelligence; and relate the dynamics of group performance to the communication patterns in the social network connecting team members.

According to our current findings, the team features most correlated with team performance are mean social perceptiveness (median $r=0.34$, $p=0.01$) and the share of females ($r=0.30$, $p=0.01$). The same features are highly correlated with collective intelligence: ($r=0.54$, $p=0.00$) and ($r=0.31$, $p=0.01$). In order to quantify significance of team features w.r.t. how predictive they are of team performance, we used these features—except collective intelligence, which itself is derived from team performance data—to model team performance via elastic net regression. In the obtained models, social perceptiveness and the share of females have a dominating positive impact on team performance. Having embedded teams in a latent feature space, the performance of the predictive models improves, and the highest positive impact on team performance gets attributed to the latent variable mainly comprised of the share of females, and social perceptiveness, and highly correlated with the collective intelligence ($r=0.62$, $p=0.00$).

Our findings agree with the existing work on collective intelligence, in that the proportion of female team members and social perceptiveness have a prominent positive impact on team performance. However, the notable distinction is that our predictors do not depend on team performance, and, thus, can be used as a “cheap version” of collective intelligence. The latter is practically important for optimal team design, when it is too expensive to test the performance of many different team configurations on a long battery of tasks, yet, is possible to test individual traits of each potential team member.

In ongoing work, we are analyzing how collective intelligence emerges in time, and studying the connection between its dynamics and the communication happening between team members. The results will provide an insight into how teams should coordinate to perform better.

Sensitive Self-disclosures and Responses on Instagram

Nazanin Andalibi (Drexel University), Pinar Ozturk (Stevens Institute of Technology), Andrea Forte (Drexel University)

People can benefit from disclosing negative emotions, events or stigmatized identities, but often they refrain to do so due to social risks such as rejection or losing their positive self-image. Some benefits of such disclosures include catharsis, sense-making, or social support. However, sharing negatively perceived emotions and experiences is not a common phenomenon in most social networking sites (SNSs). Norms on SNSs such as Facebook often favor positive expressions over negative ones.

Psychologists have noted that imagery can be an effective medium for expressing difficult emotions. SNSs like Instagram offer unprecedented opportunity for image-based sharing. In this paper, we use visual and textual qualitative content analysis and statistical methods to analyze a sample of depression-tagged posts, associated comments, and relationships between them. We respond to the following research questions: What information do people disclose about themselves through depression-tagged Instagram posts? How do captions and images relate to each other in terms of their topics? What types of responses do depression-tagged Instagram posts attract? In what ways do different types of depression-tagged Instagram posts attract more supportive/unsupportive responses than others?

Our analysis of 800 posts suggests that people use Instagram to engage in social exchange, seek social contact, seek support, and tell detailed stories about difficult experiences (e.g., depression, eating disorder, suicidal ideation, self-harm, relationships, self-appearance). Our analysis of 1949 comments associated with these posts indicates considerable evidence of social support (i.e., emotional, informational, esteem, instrumental, network), a sense of community, and little aggression or support for harmful behavior (e.g., starving, self-harm, suicidal ideation). For instance, 32% of all comments included some sort of positive social support and 41% of posts elicited such comments. Some comments included explicit acknowledgments of feelings, thoughts, or experiences of the commenter, poster or both. This suggests that people use comments as a vehicle to validate their own and others' feelings and to engage in reciprocal self-disclosure. Additionally, we observed comments supportive of harmful behavior, comments unsupportive of harmful behavior, comments implying interest in engagement, and comments about Instagram use

and role. We also coded for emotional valence and found that positive emotions are more prevalent than negative in comments, in contrast to posts where negative emotions are more frequent.

Finally, we report on factors that influence engagement and the type of comments these disclosures attract. For example, posts containing food and beverages, or seeking support and engagement attract significantly more comments. Additionally, posts about illness, self-appearance, food and beverage, or those containing personal stories, attract significantly more positive social support. Although posts about self-harm attract comments both unsupportive and supportive of harmful behavior (i.e., comments discouraging and encouraging self-harm respectively), there are more comments unsupportive of harmful behavior than supportive. Our findings contrast the popular concern that such expressions on Instagram might solely encourage harmful behaviors; we discuss that there are positive outcomes when sensitive disclosures do occur: people make sense of difficult experiences, receive positive social support, and there is not nearly much aggression or encouragement of harmful behavior as there is positive support.

What Brings Us Together: Institutions and Linking Behavior in Early Stage Academic Communities

Katharine Anderson (Carnegie Mellon University–Tepper School of Business), Matthew Crespi (Carnegie Mellon University–Heinz School of Public Policy), Eleanor Sayre (Kansas State University)

There is considerable long-term interest in understanding the dynamics of collaboration networks: how these networks form and evolve over time. Most of the work done on the dynamics of social networks focuses on well-established communities. Work examining emerging social networks is rarer, simply because data is difficult to obtain in real time. In this paper, we use thirty years of data from an emerging scientific community to look at that crucial early stage in the development of a social network. We use this data to explore the effects of three factors on the structure of the collaboration network: growth, changes in social norms, and the introduction of institutions such as field-specific conferences and journals.

Over the past thirty years, the field of Physics Education Research (PER) has grown dramatically, from a handful of researchers, to hundreds of authors publishing nearly 150 articles a year. With this explosive growth, the structure of the collaborative community has naturally changed as well. Initially, islands of individual researchers labored in relative isolation, and the co authorship network is disconnected. Thirty years later, rather than a cluster of individuals, we find a true collaborative community, bound together by a robust collaboration network. However, this change did not take place gradually—the network remained a loose assortment of isolated individuals until the mid-2000s, when those smaller parts suddenly knit themselves together into a single whole.

During the same time period, we also observe the emergence of the “superstars” of the field. Initially, there was little to distinguish researchers from each other: the degree distribution was not skewed the way we have come to expect in other collaboration networks. But over time, a small group of researchers start accumulating links more quickly than their peers, making the network look increasingly like more established social networks. In this new, larger community, a small number of individuals are identifiable as giants of the field.

This prompts a final question: what is the source of the changes we see in this emerging community? In the rest of this paper, we consider the role of community growth, behavioral shifts, and institutional change. We are able to observe the introduction of two different institutions: the first field-specific conference, and the first field-specific journals. We also identify two relevant behavioral shifts: a discrete increase in co authorship coincident with the first conference, and a shift among established authors away from collaborating with outsiders, towards collaborating with each other. The interaction of these factors gives us insight into the formation of collaboration networks more broadly.

The role of social capital in the process of labor market entry

Anton Andersson (Department of Sociology, Stockholm University)

Access to social capital has been shown to be related to labor market outcomes and many studies have focused on how contacts are directly mobilized in the hiring process. Less research has however investigated the other ways in which contacts might have effects in the labor market. The aim of this paper is to improve the understanding of the role of social capital in the process of labor market entry for young adults. The paper asks through what pathways social capital has effects on labor market outcomes and investigates this by analyzing effects on intermediate variables

as well as how different kinds of social resources relates to the different outcomes. Social capital is understood as resources accessed in social networks and a higher social capital is argued to provide more labor market information and influence. A survey with two waves of panel data containing young adults in Sweden is utilized and social capital is measured with the position generator. Results show that social capital is related to getting a job, job prestige and labor income, but that different kinds of contacts have different effects. Upper-service-class contacts are positively related to attending university education and to get high prestige jobs while working class contacts are related to employment and higher incomes. Results also show effects of social capital on intermediate variables such as job tips and labor market confidence, and that higher social capital implies a substitution from formal to more informal search. These results are discussed in terms of what they tell us about the importance of different possible casual mechanisms for social capital on labor market outcomes.

Offline Networks on Online Communities: A Mixed-Methods Approach

Spyros Angelopoulos (InterDisciplinary Institute of Data Science - University of Italian Switzerland, Lugano),
Yasmin Merali (University of Hull)

In this paper we present a novel methodological approach for elucidating the relationship between the structure and dynamics of the evolving social networks that constitute topic-specific online communities, and the social organisation, activities and practices of the community participants. Our methodological approach combines longitudinal social network analysis with content analysis to afford a nuanced exposition of the micro- and meso- level structures, dynamics and practices that give rise to the emergence and persistence of the macro-level community phenomenology. The combination of these two analytical tools provides valuable insights about the communication patterns, norms, and governance structures implicated in cyber-social systems. We illustrate the utility of our approach using longitudinal data from an invitation-only online community of cigar smokers, which we created for the needs of our study and tracked from its initiation onwards for a continuous period of eighteen months. Our study identifies six distinctive types of activities entailing interactions that transcend the boundaries of the online community, demonstrating the potential for complex, multi-faceted socio-economic spaces that bridge the divide between virtual and embodied space, informational and material objects, and social and economic transactions. Our findings show how a stable macro-level network phenomenology and collective community identity can emerge from heterogeneous micro-level activities and practices of different individual participants. Our study affords both scholars and practitioners new insights on how to study online populations, identify problems or opportunities, and deliver interventions in networked forms.

Talking about teaching: Social networks of instructors of undergraduate mathematics

Naneh Apkarian (San Diego State University)

The Research in Undergraduate Math Education (RUME) community has long focused on students' understandings of and experiences with mathematics. This project sheds light on another part of the higher education system - the departmental culture surrounding undergraduate mathematics instruction. This paper reports on the interactions of members of a single mathematics department, centered on their conversations about undergraduate mathematics instruction.

Focusing on the department as a unit of analysis makes particularly good sense when considering introductory mathematics courses. Many institutions offer multiple sections of courses such as Calculus I each term, taught by a range of instructors. The potential variation in experiences at a single institution is remarkable, and so case studies of individual classrooms do not capture the entire picture. Another reason to take a department-level approach is the potential of the department as a unit of change. Work in education and organization science has shown that change is a social construct, best effected and sustained by a group rather than an individual.

In this study, social network surveys were distributed to 61 individuals in the mathematics department at a large research university. Network questions were used to ascertain the ties that exist between members of the community of instructors, as well as the strength of those ties. Five relational networks were measured: advice about teaching (R1); sharing of instructional materials (R2); discussions about teaching (R3); friendship (R4); and influence on instruction (R5).

The different networks have differing levels of inclusivity split, into "low" (R1, R2, and R5) and "high" (R3 and R4). This indicates that more actors are involved in discussions about instruction and friendship within the department

than the sharing of advice, instructional materials, or influence. One possible interpretation of this is that R3 and R4 are more general relations than the others. Another is that R1, R2, and R5 all seem to involve acknowledging another as “expert” at something, while R3 and R4 may be relations between equals.

Instructors of the Precalculus through Calculus 2 (P2C2) courses are disproportionately active in the networks, especially in R1, R2, and R5. This is gauged by looking at the makeup of the main component of each relationship graph (in each case the only component) and how many of each instructor type are included in that component. In R1, R2, and R5, P2C2 instructors account for significantly more of the graph component than their overall representation. The coordination of superficial aspects of P2C2 course structure (e.g., textbook, exams) seems to explain the over-representation of P2C2 instructors in the materials network (R2), but it does not directly explain their over-representation in advice (R1) and influence (R5). These network results seem to indicate that there is more to this coordination system than simply shared course elements.

Social Support and Risk Behavior within the Sexual Networks of Black Gay Bisexual and Transgender (GBT) Youth attending Balls in the San Francisco Bay Area

Emily Arnold (University of California San Francisco), Lance Pollack (University of California San Francisco), Adam Jonas (University of Chicago)

Background: The House Ball Community (HBC) is an underground community of gay, bisexual, and transgender youth who join houses, family-like social networks, that organize and compete in elaborate balls. Scant research exists on this population that has been disproportionately impacted by HIV/AIDS, and few investigators have examined the sexual networks of HBC-involved youth. Methods: From 2011-2012, we collected surveys with N=274 participants of the Bay Area HBC. Eligibility criteria included: being Black, GBT-identified, ages 18-29, having attended a ball in the past 2 years, and having had sex with a man in the past 3 months. We collected egocentric social support and sexual network data, asking a series of demographic, social support and behavioral risk items for each alter. Using E-Net, we examined homophily based on age, race, and gender within the sexual networks and also the density of the sexual networks. Results: The majority of egos were ages 24-29 (75%), currently employed (58%), and had earned a high school diploma (45%). Approximately 18% were homeless in the past year, and 27% reported living with HIV. The mean number of sexual network alters was 1.85, and density was 0.146. Mean E-I index scores suggested gender and race homophily (EI index: -0.746, -0.317 respectively). However, heterophily existed on age (EI index: 0.871), indicating that sexual network members were more likely to be men, more likely to be Black, yet less likely to be the same age as the egos. Within the sexual networks themselves, 77% of alters that the egos had sex with most often in the previous 3 months were Black, 36% were 30 or older, 58% were considered to be main partners, 6% were in the same ballroom house as the ego, and 25% lived with the ego. Egos reported high levels of HIV-related risk behavior with many of their alters, 38% engaged in non-injection drug use with ego, and only 36% used condoms all the time when they engaged in anal intercourse, with 65% reporting that they had used condoms the last time they had sex with their most frequent sexual partner. Despite the amount of HIV-related risk behavior in the sexual network, it also provided ego with a source of social support. 47% of respondents reported that they were “very close” with their most frequent sex partner, 79% reported that they could talk to their partners about “things that matter.” Instrumental support was also available for many, with 74% reporting that their most frequent sex partner would help them in an emergency, 61% stating that the partner would provide a place to stay for a few nights, and 78% indicating that they could borrow \$40.00 from their most frequent sex partners. Conclusions: While many egos engaged in high levels of risk with their sexual network alters, they also received emotional and instrumental social support from many of these same alters. It appears that the ties within the sexual networks of HBC-involved youth confer both social support and HIV-related risk, making them uniquely interesting for HIV prevention researchers.

Changing Role of Personal Ties in Russian Labour Market

Elena Artyukhova (Higher School of Economics), Olga Mayorova (Higher School of Economics)

Empirical findings show (Clarke 1999; 2000; Gerber and Mayorova 2007; Yakubovich and Kozina 2000), that significance of personal networks in getting a job in Russia had been increasing during the transition to a market economy in 1985-2001. Competing approaches had offered different explanations of the cause of this increase and made radically different predictions for the future role of personal ties in Russian labor market. For example, Clarke saw networks as a legacy of the Soviet relationships between managers and workers and predicted total closure of the labor market

in Russia. Yakubovich and Kozina argued it was a temporary increase which would subside once uncertainty of the transitional period decreases and new market institutions take over the hiring process. Our paper examines the role of personal networks in Russian labor market and its evolution during market economy from 2000 thru 2014. We use panel data from the Russian Longitudinal Monitoring Survey to test whose prognosis became true. We also examine how weak-strong tie use in job search had changed. In addition, we analyze the effect of personal networks on the quality of the jobs found and changes in this effect over time across various groups of workers.

Pottery Classification with Triad Tests on Network Positions

Jan Christoph Athenstädt (Universität Konstanz), Katarina Enggist (Leiden University), Corinne Hofman (Leiden University), Ulrik Brandes (Universität Konstanz)

We propose a method to classify sherds of pottery by clustering a weighted network generated through triad tests on the positions in a two-mode network. We compare the results to existing clustering approaches in a case study in the Caribbean.

For the analysis of pottery, typically each sherd is described in multiple categories. The dimensions of these categories are either nominal or on an interval scale. It is possible to directly perform a cluster analysis on these dimensions with a method such as k-prototypes. However, there are a number of limitations to this approach: (a) within each category, some pairs of nominal values are more similar to each other than others, (b) there is no inherent way to treat missing values in a single dimension, (c) it is not clear how to weigh the different categories and a distance between every pair of sherds is generated, and some sherds might not be comparable.

We propose to address the limitations by (a) quantifying expert knowledge in subdimensions that capture distances between values, (b) using a network positional approach which does not require full categorizations, and (c) perform triad tests that allow control which dimensions are compared. The resulting weighted network can be clustered with a clustering method of choice, yielding a categorization of the sherds.

As a first practical evaluation, we perform a case study on pottery assemblages from the Caribbean, in which we compare a clustering on the initial dataset of nominal and interval categories with a clustering on the weighted network resulting from the steps above.

Business Policemen behind the Blue Veil of Silence: Determinants of Centrality, Sentencing, and Whistleblowing in Elite Corrupt Networks

Ivan Aymaliev (National Research University Higher School of Economics)

Despite institutional change, corrupt networks have been tremendously successful enterprises at the expense of the public good; returning and evolving with new elements. For corruption to prosper, it must possess remarkable leaders, and an efficient and resilient social organization.

Different crime cultures exhibit different modus-operandi. Corrupt top policemen, having monopoly over violence and coercion and operating within a paramilitary bureaucracy, have different incentives to form ties from ideology-driven terrorists, politically-motivated mafiosi, or profit-seeking criminals.

Given the understudied nature of organized police corruption and its deleterious consequences for socioeconomic development and inter(national) security, we seek to understand- “Why are certain corrupt members more central than others?” and “How does personal centrality in a corrupt network affect the probability of law enforcement outcomes and whistleblowing?”

To address these questions, we draw upon organized crime and covert networks theories and use documentary and archival data to reconstruct the actual cooperation networks involved in high-profile police corruption scandals in Australia, Bulgaria, Canada, China, Russia, the United Kingdom, and the United States.

Historically, police corruption has been organized around charismatic, well-connected, ruthless, high-ranking officials able to arrange for corruption, forge political alliances, and recruit capable, trustworthy criminal minds. However, criminal networks face a trade-off between secrecy and moneymaking. More central players have more associates, are involved in more criminal activities, and thus are more visible. Therefore, an actor’s location in a criminal network should influence the likelihood of penalties.

The study of organized elite corruption is important for both theory and policy. We contribute to secret societies, covert networks, organized crime, and organizational theories by studying elite illegal networks comprising public servants and their clients. Furthermore, our study explores the extent to which theories based on legal, secret or criminal networks are generalizable to corrupt alliances. Identifying the socioeconomic characteristics of highly successful corruption entrepreneurs, and exploring the web of their hidden interactions, may allow us to design better anti-corruption policies.

Despite operating in largely different institutional regimes, organizations, societies and time, the covert networks exhibit a similar topology. They are scale-free, more centralized, sparser, have slightly longer average path lengths, and lower clustering coefficients than their random counterparts are on average. Therefore, the structure of the corruption networks is driven primarily by the need to maximize personal gain rather than the need to maximize concealment.

We model personal centrality as a function of actor work occupation, rank, criminal reputation, ability to maintain the secret code, membership in secret organizations, gender, and network fixed effects. We further predict allegation, arrest, verdict (guilt or innocence), murder (formal death sentence or gun-justice), sentence, and whistleblowing as functions of personal centrality in the shadow alliance, management level, work occupation, marriages, gender, democratic and economic transition, and network fixed effects.

Longitudinal Analysis of Collaboration Graphs of Forked Open Source Software Development Projects Using an Actor-Oriented Social Network Analysis

Emerson Amirhosein Azarbakht (Oregon State University)

Longitudinal Analysis of Collaboration Graphs of Forked Open Source Software Development Projects

Social interactions are a ubiquitous part of our lives, and the creation of online social communities has been a natural extension of this phenomena. Free and Open Source Software (FOSS) development efforts are prime examples of how communities can be leveraged in software development, where groups are formed around communities of interest, and depend on continued interest and involvement.

Software development community splits are referred to as forking. Forking in FOSS, either as a non-friendly split or a friendly divide, affects the community. Such effects have been studied, shedding light on how forking happens. However, most existing research on forking is post-hoc.

In this study, we focus on the seldom-studied run-up to forking events. We propose using statistical modeling of longitudinal social collaboration graphs of software developers to study the evolution and social dynamics of FOSS communities. We aim to identify measures for influence and the shift of influence, measures associated with unhealthy group dynamics, for example a simmering conflict, in addition to early indicators of major events in the lifespan of a community.

We use an actor-oriented approach to statistically model the changes a FOSS community goes through in the run-up to a fork. The model represents the tie formation, breakage, and maintenance. It uses several snapshots of the network as observed data to estimate the influence of several statistical effects on formation observed networks. Exact calculation of the model is not trivial, so, instead we simulate the changes and estimate the model using a Markov Chain Monte Carlo approach.

When we find a well-fitting model, we can test our hypothesis about model parameters, the contributing effects using T-tests and Multivariate Analysis of Variance Between Multiple Groups (Multivariate ANOVA). Our method enables us to make meaningful statements about whether the network dynamics depends on particular parameters/effects with a p-value, indicating the statistical significance level.

This approach may help predict formation of unhealthy dynamics, which gives the community a heads-up when they can still take action to ensure the sustainability of the project.

Relationship Marketing in Guanxi networks: A Social Network Analysis Study of Chinese construction Small and Medium-sized Enterprises

Sulafa Badi (UCL), Lisha Wang (UCL), Stephen Pryke (UCL)

Despite the significance of Guanxi networking as the integrated approach to relationship marketing in the Chinese business environment, there remains, however, a limited understanding of the structural and relational characteristics of these stakeholder networks, within which value is jointly created and shared. This study offers an egocentric view of Guanxi as a web of value-adding relationships upon which a Chinese business owner (ego) is embedded. The value-adding ego-networks of the business owners in four Chinese construction small- and medium-sized enterprises (SMEs) are examined. We explore questions such as: What are the specific structural and relational characteristics of a Chinese SME business owner value-adding Guanxi network? With whom does the business owner choose to connect? Why? And how are these ties built and maintained? Which stakeholder groups are the most important to an SME Business owner during the different stages of the firm's life cycle? Adopting the 'six markets' model (Christopher et al., 2002), the relationship between the business owner and six main stakeholder groups was identified, quantified, analyzed, and visualized using Social Network Analysis (SNA). Relationships were measured according to the frequency of communication, the value of favour exchanges, and the amount of emotional investment in the relationship. Comparative SNA studies were conducted, focusing on ego network density, tie strength, and prominence of key stakeholders. The findings highlighted the high degree of embeddedness in Chinese SMEs with Guanxi ties (both strong and weak) dominating the construction business owners' network. They also underlined the prominence of the internal markets of multi-skilled staff and business-development managers. Business owners cultivate Guanxi with their employees to retain talents and enhance employee loyalty. Transactional ties, albeit a minority, also exist in the business owners' network, which confirms that both relational and transactional marketing coexist in the Chinese construction industry. By making visible the structure of a business owner's ego network, SNA may act as a useful diagnostic marketing tool for entrepreneurial business. In particular, it will provide greater transparency in understanding stakeholder relationships, reveal prominent stakeholders, and allow for the development of network-based strategies to improve relationships with stakeholders by identifying emergent opportunities and facilitating strategic value choices. The study draws managerial implications for entrepreneurial business owners and managers, and proposes directions for future research.

The Spatial Properties of Radical Environmental Organizations in the UK

Benjamin Bagozzi (University of Delaware), Zack Almquist (University of Minnesota)

Radical environmental groups and the individuals who comprise those organizations have a wide and varied agenda which often encompasses both local and global issues. In their efforts to call attention to environmental problems, communicate with like-minded groups, and mobilize support for their activities, radical environmental organizations also produce an enormous amount of text, which can be used to estimate the complex communications and task-based networks that underlie these organizations. Moreover, the tactics employed to garnish attention for their agenda can range from peaceful activities such as information dissemination to violent activities such as fire-bombing buildings. To obtain these varied objectives, environmental organizations must harness their networks, which have an important spatial component that structures their ability to communicate, coordinate and act on any given agenda item. Here, we analyze a network built from communications and information provided by the semi-annual "Do or Die" (DoD) magazine published in the UK over a 10 year period in the late 1990s and early 2000s. We first employ structural topic model methods to discover violent and non-violent actors within the larger environmental community. Using this designation, we then compare the spatial structure of these two groups, finding that both violent and non-violent groups are more likely to engage in coordination/communication if they are sufficiently close, but exhibit a quickly decreasing probability of interaction over even a few kilometers. Further, both groups have a higher probability of coordination/communication with their own group than across group over distances of 50 kilometers or more. This suggests that violent and non-violent environmental groups seek each other out over large distances.

The impact of critical labour market transitions on social networks

Sebastian Bähr (Institute for Employment Research (IAB))

Social Networks are an important source of support in coping with episodes of unemployment and for re-entering employment. With the help of German panel data, I analyse the changes in social embeddedness of respondents during critical phases in their employment biographies. Current research expects heterogeneous adaptation strategies, ranging from social isolation of long-term unemployed individuals to a complete restructuring of social networks (e.g. Marquardsen 2012). Many of the studies, on which we base our understanding of network dynamics in the context of unemployment, stem from less than ideal data to arrive at representative conclusions. Often these studies

use exclusively qualitative data, rely only on small number of cases, are cross sectional, or are based on outdated institutional settings (e.g. before the Hartz-Reforms of the early 2000s in Germany). I use current data from the German panel study "labour market and social security", which provides representative samples of both unemployed and general population samples, includes eight waves of rich labour market and life course information as well as a range of indicators for respondents' social network and social resources. My analysis is based on arguments from social capital theory (Coleman 1992; Flap & Volkers 2013) and social psychology (Clark 2003). I put past findings like the tendencies towards social isolation through job loss to the test. Utilizing the longitudinal structure of large panel data I apply fixed-effects regression with dummy impact functions to provide detailed information about anticipation and adaptation effects. The particular oversampling of unemployed persons allows identifying heterogeneous adaptation strategies of small subgroups. This approach should help to foster our understanding of the social dynamics surrounding critical labour market transitions.

Business Unity and Corporate Responses to Social Movement Protest

Tarun Banerjee (University of Pittsburgh)

Do large corporations respond to social movement protests following a firm-centric rationale or do they develop their strategies relationally? If they do so relationally, does a firm's embeddedness in class-wide networks shape its responses to protests? I address these questions through an examination of protests against U.S. Fortune 500 firms over 6 years (2005-2010). I incorporate data on board of director interlocks and corporate involvement in policy-planning organizations to test the effect of corporate networks on a firm's behavior. I find that embeddedness in class-wide networks is associated with increased hostility to protest (seen in fewer concessions and more retaliations against protestors). However, this is moderated in two key ways. 1) Embeddedness in the interlocking directorate network leads to more openness to protest demands prior to the financial crisis of 2008. 2) The effect of policy group affiliations is shaped by the ideologies of the groups in which the firm is embedded: firms connected to relatively liberal groups are more amenable to protestors while those connected to conservative groups are more hostile. These findings suggest class-wide networks shape corporate responses to protests in historically situated and ideologically identifiable ways.

Multiplexing and changes in borrowing, favor exchange, and advice networks in response to the availability of formal markets.

Abhijit Banerjee (MIT), Arun Chandrasekhar (Stanford University), Esther Duflo (MIT), Matthew Jackson (Stanford University)

We investigate how poor societies that are exposed to microfinance loans, experience changes in internal social network structure. We examine whether such exposure not only changes the internal borrowing and lending networks, but also whether this spills over and affects other networks such as exchange of favors and advice. We provide a theoretical framework for understanding why eliminating some borrowing and lending relationships impacts favor and advice relationships. We then investigate this empirically using a detailed longitudinal data set of 75 villages in rural India, of which 42 villages were exposed to loans while another 33 - otherwise identical villages - were not exposed. We did detailed mapping of social networks before and after exposure to microfinance over a period of more than five years, and then can compare the differences in the evolution of the networks in the microfinance-exposed villages to the control villages. We find that the villages that were exposed to microfinance not only see a significant loss in borrowing and lending relationships compared to villages that were not exposed, but also see a significant loss in the number of favor exchange and advice relationships, and experience other structural changes in social networks. We also document an increased inequality in the networks between people who take out microfinance loans and those not participating.

Scientific Collaboration in Brazilian Health Informatics Scientific Community

Roberto Baptista (Universidade Federal de São Paulo), Gabriela Araujo (Universidade Federal de São Paulo), Fabio Teixeira (Universidade Federal de São Paulo), Ivan Pisa (Universidade Federal de São Paulo)

Introduction

Health Informatics (IS) is an interdisciplinary field that combines many different science fields. In Brazil the number of publications and events in IS has been growing fast and attracting more and more researchers. But it is still not clear how each field contributes to the growth of IS in Brazil.

Objective

This study aimed to analyze the scientific collaboration between the different fields involved in IS research in Brazil using social network analysis metrics.

Methods

A list of 889 names was prepared considering attendees of the last four Brazilian Congress of Health Informatics and members of Brazilian Society of Health Informatics. Other names were included by our group for its experience and knowledge in the IS area. Lattes Platform, a national curricula platform maintained by the Brazilian Government, was used as data source. Lattes Platform has more than two million curricula nowadays. ScriptLattes (scriptlattes.sourceforge.net) was used to extract data (such as papers, co-authoring, student-advisor relationships) and to generate a GraphML file. The file was imported into Gephi software (gephi.org). Two networks were obtained. The former represents researchers as nodes and their relationships as edges. The latter considered the major science fields as nodes and collaborations between researchers as edges, thus representing the collaboration between fields. For each major science field a subnet was extracted and overall metrics were calculated.

Results

A dataset was obtained with 889 curricula in 9 major areas. The major area with greater internal collaboration was Exact and Earth Sciences ($N = 395$; $E = 407$, diameter = 17, density = 0.0050; Avg Path = 6.021). The second one was Health Sciences ($N = 367$; $E = 323$; diameter = 18; density = 0.0048; Avg Path = 6.0915). The lowest one was in Agricultural Sciences ($N = 3$; $E = 0$; diameter = 0; Density = 0; Avg Path = NaN).

Conclusion

When considering other types of relationships also as collaboration instead of only scientific papers, a different view can be observed about the collaboration between researchers in IS. Since all researchers and institutions are required to maintain their records up to date, the Lattes Platform can enable a wide range of analysis. As future work, all the health sciences fields will be considered and an author-topic model will be constructed jointly to enable a deeper understand of health sciences collaboration.

Political contributions pre and post Citizens United

Roy Barnes (University of Michigan-Flint)

There is a significant body of literature on the political contributions of corporations and corporate directors at the turn of the 21st century in the United States. However, on 10 January 2010, the United States Supreme Court struck down the prohibition of corporations from making independent expenditures and spending unlimited amounts of money in its *Citizens United v. Federal Election Commission* decision. Given this seismic shift upon the terrain of political contributions, this research examines the pattern of political contributions pre and post *Citizens United* among the corporate directors of the Fortune 100 in 2005 and 2014. The questions to be addressed in these exploratory and descriptive analyses include documenting the differences in the levels of political contributions among the directors in both time periods, as well as an examination of the network structure of the interlocking directorates before and after the *Citizens United* case.

Dynamics of the Worldwide Web: A Longitudinal Analysis of the Two-mode Network of Website Use by Country

George Barnett (University of California, Davis), Ke Jiang (University of California, Davis), Billy Liu (University of California, Davis)

This research examines the structure of the worldwide web and how this network changes overtime. Daily data on the use of the world's 500 most visited websites by 118 countries are being collected from Alexa.com. This process began September 1, 2015. A time series of two-mode networks is being created. Additionally, the rank order of individual website use for each country is being gathered. Both the worldwide website network, based on shared use

by country, and the international network, based on joint website use, as well as the two-mode network are analyzed. Past research indicates that these networks have a center-periphery structure along with a number of linguistic and cultural sub-groups. The description the structure of the network will provide further evidence to answer the following questions. Is the worldwide web a core-periphery network centered about the United States and American websites, and is it a small world network composed of a series of linguistic and cultural communities? Further, through the use of statistical methods (QAP correlation and spectral [frequency domain] analysis) overtime changes in the overall network are examined to describe the evolution of the network, as well as, to determine the effects of unanticipated shocks (the terrorist attacks on Paris) and predictable events (national holidays, black Friday and cyber Monday) on the network.

The Duality of Imposed and Emergent Meanings: A Socio-Semantic Network Analysis of Artistic Collectives

Nikita Basov (SPbSU), Alexandra Nenko (NRU ITMO)

This paper applies socio-semantic network analysis to address the question of how meanings come into being. While meanings are imposed by fields (DiMaggio, 1986; Friedland and Alford, 1991; Mohr, 2009), actual joint practice of agents often follows the necessities of the ‘matters at hand’ rather than corresponds to prescriptions of fields (Bourdieu, 1990; 1992) which can result in emergent meanings transforming fields and mediating them (De Nooy, 2003). To get an insight on how the duality of imposed and emergent meanings works this paper extends two-mode network-analytical approach to meanings with two-level socio-semantic approach and supplementing it with qualitative data analysis studies artistic collectives - groups of artists involved in intense interaction with each other. Those, on the one hand, tend to reproduce widespread meanings, but on the other hand, are able to jointly elaborate meanings of their own. Semantic network analysis of textual corpora produced by collectives shows that in accordance with field logic shared meanings in the collectives mostly differ between individuals representing different (sub)fields as they reproduce certain cultural categories corresponding to those (sub)fields. It is confirmed by analysis of qualitative data: ethnographies, narrative interviews and written texts. Such a division corresponds results of formal subgroups detection in the collectives’ social networks mapped with sociometric surveys. This suggests that meanings come into being in a struggle for distinction both within and between fields and that this struggle takes place even within socially cohesive groups with common visions. At the same time, social networks show that intersubjective ties are still quite strong across the boundaries of (sub)fields while analysis of semantic intersects between individuals who represent different (sub)fields reveals emergent meaning structures that blend objective categories of (sub)fields in joint practice.

Core-periphery dynamics in thematic subnetworks: a case study of social media adoption by outreach professionals

Marco Bastos (University of California, Davis), Mark Lubell (University of California, Davis), Carlo Piccardi (Polytechnic University of Milan)

With internet penetration rates rising in rural communities stakeholders are experimenting with social media to distribute specialized information across local, national, and global networks. We identified a cohort of 153 individuals responsible for the outreach initiatives at the University of California and mapped the first and second level network of followers connected to this community, thus rendering a population of 59K users that tweeted over 250M tweets. We inspected user’s interactions by means of @-mentions and retweets and identified 10 large modules corresponding to specific areas of agricultural expertise. We subsequently generated multiple Erdos-Renyi random graphs and compared the estimates of core-periphery in the random graph with the estimates in each subgraph. We found that the random subnets present consistently lower correlation between coreness and degree compared to the observed subnetworks. We discuss the results and argue that the core-periphery topology of specialized communities is structured around cores and peripheries broadly consistent with the separations between topical experts and general public.

Corrected overlap weight and clustering coefficient

Vladimir Batagelj (University of Primorska, Andrej Marušič Institute, Koper)

We discuss two well known network measures: the overlap weight of an edge and the clustering coefficient of a node. For both of them it turns out that they are not very useful for data analytic task to identify important elements

(nodes or links) of a given network. The reason for this is that they attain their largest values on complete subgraphs of relatively small size that are more probable to appear in a network than that of larger size. We show how the definitions of these measures can be corrected in such a way that they give the expected results. We illustrate the proposed corrected measures by applying them on the US airports network using the program Pajek.

Bound to Help? Measuring Sense of Obligation in Strong Ties

Lindsay Bayham (UC Berkeley), Liana Prescott (UC Berkeley), Matthew Stimpson (UC Berkeley)

Scholars have tended to assume that strong ties carry a sense of obligation to provide social support in times of need. However, this sense of obligation has rarely been directly measured. Using preliminary data from a new survey of social ties and social support in the San Francisco Bay Area (UCNets), we directly measure the sense of obligation that people feel to help particular social ties. We find that sense of obligation varies not only by the strength of the tie—obligation is positively correlated with traditional measures of tie strength such as emotional closeness and frequency of contact—but also by characteristics of the respondent. Those who are older and lower-income are less likely to report feelings of obligation. Interestingly, this finding is actually driven by a significant subset of respondents who report no obligation to any of their strong ties—this group is disproportionately likely to be older and lower-income. We discuss the implications of our results for the measurement of tie strength and for theories about strong ties and social support, particularly how people might try to balance the benefits and strains that strong ties can provide.

The Shifting Landscape of Social Networks Journal: A New Method for Tracking Evolution of an Interdisciplinary Field

George Beknazar-Yuzbashev (National Research University Higher School of Economics), Yana Maria Priestley (National Research University Higher School of Economics)

The methods employed for tracking scientific evolution could be classified into two broad categories. The “top-down” approach is to map science as a whole and then try to discern meaningful groupings and their evolution. While powerful for broad conclusions, it lacks the precision necessary for analysis of a particular field. The “bottom-up” approach defines a field first and then tracks the connections within it. It requires the researcher to hand-pick the rules according to which the field is defined, and that brings in an element of unwanted subjectivity. In this paper we attempt to avoid the pitfalls of the two approaches through tracking evolution of the citation network of a particular journal.

The main problem for the task at hand is discerning meaningful citations from those that are less important. Instead of relying on arbitrary choice of keywords, scholars, or journals, we propose a general algorithm for picking the wheat from the chaff and employ it to track the evolution of Social Networks Journal. From among the papers citing SNJ we pick those that are (at some later point) cited by SNJ back. We call these authority papers, because could reliably considered more relevant to the development of the subject matter of SNJ than those not cited back. The next step is to look at the papers that are citing SNJ without being cited back but pick only those that are (at some later point) cited by an authority paper. This algorithm allows us to define the set of relevant articles and discard the rest.

Upon collapsing the papers into journals by year we are able to build a citation network with relevant journals as nodes and analyze this weighted longitudinal network. Additionally, eigenvector centrality allows us to study the evolution of comparative relevance of particular journals within the field.

Episodic Relationships and HIV in Disease Networks

David Bell (Indiana University Purdue University Indianapolis)

Most significant network relationships are developed within one’s social neighborhood, those people with whom one is most often in contact. Some relationships with those who share a residence or a work location are enacted continuously. But many important relationships are episodic—here today, gone tomorrow, back again in a few days or weeks or longer. Episodic risk relationships, such as sexual and drug injecting relationships, create two kinds of increased risk. In the first place, episodic relationships represent concurrency in that they allow for bidirectional transmission of diseases (Morris & Kretzschmar, 1995, 1997). In the second place, episodic relationships increase risk as they increase the number of risk partners that a person can feasibly maintain over time. Thus it is important

to investigate the level of protection in episodic relationships.

When it comes to the potential disease effects of episodic relationships, it is important to consider HIV status as well as the match of HIV statuses between partners. In this study we examine the sex and drug use behaviors of three kinds of persons: Role 1s who are infected with HIV (HIV+), Role 2s who are sex or injection partners of Role 1s, and Role 3s who have no risk partners who are objectively or subjectively HIV+. Thus we compare Role 1/1 relationships where both partners are HIV+, Role 1/2 relationships where one partner is HIV+ and risk of HIV transmission is immediate, Role 2/3 relationships where risk of HIV transmission is potential, and Role 3/3 relationships where transmission is perceived to be unlikely. While a Role 3 has little or no subjective risk of infection with HIV, Role 2s not only have a subjective risk of infection with HIV from the Role 1 partner; they also have the potential risk of transmitting HIV to their Role 3 partners.

Data for this study were collected as part of a longitudinal community (non-clinical) sample of drug-using and nonusing persons. Participants completed up to fourteen interviews at three-month intervals (median = 11). Together 203 participants described relationships to a total of 825 sex partners and 291 injection partners. Heterosexual relationships were described an average of 2.57 times, MSM relationships 1.74 times and injection partners 1.53 times.

Role 1/1 risk relationships represent 4% of observed relationships (N=115), while 11% are role 1/2, 16% are Role 2/3 and 69% are Role 3/3 relationships. Using heterosexual relationships as an example, episodic relationships tended to have lower levels of sex risk than continued relationships (Role 1/1: .27 vs. .51 risk levels; Role 1/2: .46 vs. .58; Role 3/3: .27 vs. .54) Among the critical Role 2/3 heterosexual relationships, episodic relationships had higher levels of risk than continued relationships (.39 vs. .30). These are lower levels of risk than Role 1/2 relationships, so there is some protection provided by these relationships, but the higher risk among episodic relationships suggest that protection is limited in these important relationships.

The evolution of research collaboration within and across disciplines in Italian Academia.

Elisa Bellotti (University of Manchester), Luka Kronegger (University of Ljubljana), Luigi Guadalupi (Institute for Research on Innovation and Services for Development (IRISS), National Research Council (CNR))

In sociology of science much attention is dedicated to the study of scientific networks, especially to co-authorship and citations in publications. Other trends of research have investigated the advantages, limits, performances and difficulties of interdisciplinary research, which is increasingly advocated by the main lines of public research funding. This paper explores the dynamics of interdisciplinary research in Italy over ten years of scientific collaboration on research projects. Instead of looking at the output of research, i.e. publications, we analyse the original research proposals that have been funded by the Ministry of University and Research (MIUR) for a specific line of funding, the Research Projects of National Interest (PRIN). In particular, we want to see how much interdisciplinary research has been conducted during the period under analysis and how changes in the overall amount of public funding might have affected disciplinary and interdisciplinary collaboration. We also want to cluster the similarities and differences of the amount of disciplinary and interdisciplinary collaboration across scientific disciplines, and see if it changes over time. Finally, we want to see if interdisciplinary projects are more profitable in terms of received funding than their disciplinary bounded counterparts. Our results indicate that while interdisciplinary research diminishes along the years, potentially responding to the contraction of public funding, research that cut across disciplinary boundaries is overall more remunerative than research confined within disciplinary boundaries. Furthermore, the clustering procedure do not indicate clear and stable distinction between disciplines, but similar patterns of disciplinary and interdisciplinary collaboration are shown by discipline with common epistemological frameworks, which share compatible epistemologies of scientific investigations. We conclude by reflecting upon the implications of our findings for research policies and practices and by discussing future research in this area.

Social Entrenchment: Social Network Cohesion and Board Responsiveness to Shareholder Activism, 1998-2013

Richard Benton (University of Illinois)

Shareholder activism has become an increasingly prominent means for investors to voice their concerns in corporate governance matters. Past work examines a number of firm and proponent characteristics that affect shareholder proposal targeting, voting, and implementation outcomes. However, we know little about how social network ties among firms and corporate leaders affect shareholder activism. Prior research suggests that social cohesion among corporate leaders helps preserve managerial control. Drawing on this tradition, I argue that social cohesion in the

board overlap network helps managers and firms resist shareholder activism. I test these ideas with data on overlapping board appointments and shareholder proposals for S&P 1500 firms. To examine how network cohesion varies across the network topology, I apply a hierarchical cohesive blocking routine that characterizes how firms are nested within more or less structurally cohesive substructures. Results from indicate that deeply nested firms (firms in more cohesive substructures) are more likely to be targeted by activists but these proposals draw less voting support and are less likely to be implemented by the board. I argue that structural cohesion helps support norms of reciprocity and mutual regard among corporate elites that is useful for maintaining managerial control and resisting shareholder activism.

Narrative methods for the analysis of network ties

Stefan Bernhard (Institute for Employment Research)

Since the cultural turn in network analysis numerous works have dealt with the co-constitution of culture and networks. I engage with this line of research by bringing together two strands of research: (a) Harrison C. White's network theory and (b) qualitative methods of detailed text analysis. In particular, I draw on recent developments in narrative analysis of identities and show how its linguistic techniques can be used to trace the co-construction of identities and ties in stories on personal networks. I demonstrate my approach empirically using data on professional ties from narrative interviews with nascent entrepreneurs.

Estimating Thresholds in Empirical Social Contagion

George Berry (Cornell University, Department of Sociology), Christopher Cameron (Cornell University, Department of Sociology)

We identify a missing data issue that impacts the estimation of individual adoption thresholds from empirical network data. We show that naive estimation procedures result in tremendous upward bias in threshold estimates and suggest measurement and estimation strategies that significantly reduce the impact of missing data on estimates of the distribution of thresholds. Finally, we explore applications of the suggested estimation procedures.

Social scientists have frequently used threshold models to examine adoption processes. In network contagion models, an agent adopts a contagion after exposure to a sufficient number of already active network neighbors. An agent's threshold is the number or proportion of active neighbors required to trigger adoption. Such theoretical models assume a threshold distribution and a network structure, and examine the implications of these assumptions on cascade behavior. While we have relatively good pictures of population-level network structures, we know comparatively little about threshold distributions. Previous empirical work in this area has proceeded by recording the number of activated neighbors at the time of adoption. In this paper, we demonstrate that this approach leads to strongly upwardly-biased estimates of threshold distributions, and suggest a combination of heuristics and estimation procedures to reduce the bias.

We present analytical and simulation results which indicate that, for a wide range of contagion processes, the structure of the network itself prevents observing some true thresholds due to events we term collisions. A collision occurs when, in a given time interval, more than one of an agent's neighbors adopt, and then the agent adopts in the next time step. In this case, the agent's true threshold lies in a range—and previous research has essentially taken the maximum of this range. We view these uncertain cases as a missing data problem, and observe that the missing rate can be over 70% in some simulations. Recognizing that real-world processes almost certainly have this missing data problem, we provide simulation evidence that dropping cases where collisions occur and employing regression adjustment can reduce the bias of estimates.

We suggest two important applications for obtaining estimates of the distribution of thresholds in a population: 1) Examining the unique properties of large cascades. For instance, in the case of large cascades, do threshold distributions near the beginning of the cascade need to be particularly low to reach critical mass? This has been suggested by prior simulation work. 2) When thresholds are viewed as a function of agent covariates, the approach presented in this paper becomes a prediction tool that can be used in diverse ways. For instance, in the realm of public health, it is well-established that agents look to their neighbors' behavior in making health decisions. Having an estimate of how susceptible an agent is to neighbor adoption can lead to more efficient strategies for promoting adoption of healthy behaviors, such as eating habits and vaccinations.

Empowering Health Workers in Low-Resource Areas to Engage in Network Analysis

Emily Beylerian (PATH), Jessica Shearer (PATH)

As the global health field begins to embrace network data, much of the interpretation and analysis tends to happen far away from data collection. A tool that makes network concepts accessible to a wide range of skill levels and backgrounds would enable potential users, including health workers, policymakers, and civil society, to feel more connected to the results. We propose a web-based tool for visualizing and analyzing network data in low-resource areas. Built with functionality from the statnet suite of R packages and based on statnetWeb, this tool is customized for an audience in low resource areas. This tool will empower NGO staff, health workers and others to interact with and gain greater understanding of network data from their own areas. In order to help ensure adoption of the tool, we consider a framework for successful development and implementation, which takes into account people- and process-related barriers to a tool's usefulness and how technology can moderate those. The framework leads us to an application that is suitable for network analysis in low-resource settings. At the time of the conference, we will have taken the tool to field site(s) in sub-Saharan Africa and will present our findings.

The micro-relational structure of markets. Modelling transaction sequences in the EU interbank money market

Federica Bianchi (University of Italian Switzerland), Paola Zappa (University of Italian Switzerland), Alessandro Lomi (University of Italian Switzerland)

The view of markets as social structures emphasizes the idea of market structure as induced by exchange relations among market actors. One of the main assumptions underlying this view is that the network structure of markets may be explained in terms of the underlying micro-relational events determined by time-ordered transactions connecting buyers and sellers. Although relatively uncontentious, this assumption has not been significantly investigated yet. In this paper, the focus of study moves from examining actors' relational behaviors to reconstructing patterns of interaction and exchange. We situate our study in the context of the EU interbank money market. Because of the increasing availability of financial data on tick by tick transactions, this represents an ideal setting for our empirical investigation. In particular, we examine the complete set of 305,489 lending events observed on the e-MID trading platform between all the 194 banks participating in the market for overnight transactions during the period January 2006-December 2009. We develop a relational event framework to pursue three different analytical goals. The first is to reveal the emergence of self-organizing sequences of relational events defined in terms of financial transactions. The second is to explain how self-organizing properties of transaction sequences shape future transactions. The third is to document how patterns of self-organization endure or change over time. In particular, we track how market transactions respond to exogenous shocks represented by the recent global financial crisis. In the context of financial markets, our modeling efforts account for the interdependencies linking micro-relations and macro-structures and help to illuminate the complex multi-level processes influencing the emergence and the evolution of markets.

Coworking and Social Support among Peers. A Multivariate ERGM of Economic and Social Exchange between ICT Freelancers

Federico Bianchi (University of Brescia / University of Milan), Niccolò Casnici (Department of Economics and Management, University of Brescia), Flaminio Squazzoni (Department of Economics and Management, University of Brescia)

This work aims at understanding how social support ties form from economic exchange. We studied a multiplex network of instrumental and expressive relationships in a group of independent workers who occasionally collaborate for business purposes. We tested (i) the effect of professional collaborations on the formation of support ties; (ii) the role of business-related trust as a mechanism underlying this relationship; (iii) the endogenous effects of reciprocity and closure on the formation of a support network. We collected network and demographic data through a questionnaire, which was personally administered to all the 29 freelance workers who share an ICT- focused coworking space located in Brescia, North-western Italy. This group was selected because the coworking space did not have any formal organizational structure providing incentives to professional collaboration between its members. This was an ideal context for disentangling the spontaneous formation of social ties from economic interactions. The data collection followed a 3-month ethnographic pre-study, which helped to understand the context, obtain full participation to the survey, and calibrate the questionnaire. Network data have been collected by means of the name-generator approach.

Social support was measured by asking each subject whom they would turn to in case of need of material and emotional help for non work-related issues. A professional collaboration matrix resulted from the integration of data on incoming and outgoing flows of transactions, weighted by the related satisfaction level. In order to test the role of business-related trust, subjects were asked to cite trustworthy people as potential business partners. Finally, data about covariate networks were collected as control factors: advice-seeking within the previous 12 months, friendship, and previous acquaintance. We also gathered data about sociodemographic and business-related characteristics of the actors (age, gender, education, seniority, business revenues) and measured their baseline levels of generalized trust and group identification. We modeled social support together with trust by applying a family of multivariate exponential random graph models, controlling for actor-relation effects and exogenous effects yielded by covariate networks. We found that reciprocity was not essential for the formation of support ties. Conversely, we found a positive effect of path closure and a non-significant effect of cyclic closure. This suggests the emergence of local clusters where coworkers provide support by following transitive paths. Together with a strong negative effect of indegree centralization, our results show a globally decentralized flow of support which clusters locally around emergent hierarchies. With regards to multivariate effects, collaborating with another freelancer seems to increase the likelihood of developing expectations of support, regardless of the level of satisfaction with the business partner. Finally, trusting another freelancer for business purposes tends to foster expectations of support, also controlling for the other covariate networks. In conclusion, our work suggests that non-instrumental support is likely to align with trust in economic exchanges, while the outcome of a collaboration seems to be less relevant. Moreover, our study provides an interesting insight on the way informal hierarchical structures emerge among peers.

Modeling Coalitions within Constraints: An integration of Social Network and Game Theories

Elisa Jayne Bienenstock (Arizona State University), Michael Salwen (Sharper Insight LLC)

Building on the ideas from Bienenstock and Bonacich (1992, 1997) and Bienenstock and Salwen (2015) we introduce a new approach for modeling coalitions that takes into account the attributes of actors and their structural position. Social network analysis methods describe systems of relational ties among individuals. N-Person cooperative game theory was developed to model coalitions and the value of contributions individuals actors make to those coalitions. An integrated approach, composed of selected elements from each of these two approaches supports the modeling of coalescence constrained by structure. The new approach is introduced as an alternative to traditional social network and game theory for modeling networks of actors motivated to form heterogeneous teams to accomplish a goal. We demonstrate with a theoretically motivated example some of the analytical benefits of recasting the model using this integrated approach.

Individual and network predictors of HIV and STI in young men who have sex with men.

Michelle Birkett (Northwestern University), Patrick Janulis (Northwestern University), Gregory Phillips li (Northwestern University), Brian Mustanski (Northwestern)

Background: The transmission of infectious disease is dependent on the social and sexual networks of a population. However, the limited ability to obtain empirical network data restricts understandings of network drivers of disease. Therefore, this study utilized an innovative macronetwork dataset to obtain a truer understanding of both individual and network drivers of HIV and sexually transmitted infections (STIs).

Methods: Egocentric network interviews of 175 young men who have sex with men (YMSM), a population at extreme risk for HIV, were utilized. These network interviews captured social, sexual, and drug ties with 3390 alters. Alters who appeared across multiple egocentric network interviews were matched and consolidated to construct a macronetwork. Analyses identified individual, local (egocentric network), and global (macronetwork) predictors of HIV, Chlamydia, and Gonorrhea. Furthermore, analyses considered both the overall and the sexual network structures.

Results: A total of 13.7% (N = 24) of the YMSM egos had ever tested positive for HIV, while a total of 14.3% (N = 25) and 9.1% (N = 16) YMSM had ever tested positive for Chlamydia and Gonorrhea, respectively. Analyses indicated differences in the drivers of STI vs. HIV. Global network structural characteristics were associated with HIV status, over and above individual attributes, sexual behavior, and local network characteristics. Specifically, the final model indicated that high sexual betweenness centrality and low overall number of ties was significantly

associated with HIV status. Conversely, Chlamydia and Gonorrhea were not associated with global network structural characteristics, but did show associations with individual sexual behaviors and local network characteristics.

Conclusions: Macronetwork data collected from egocentric interviews can provide a valid estimate of real network structures and be a useful tool in understanding the transmission of infectious disease. These data suggest that drivers of HIV and STIs may differ, which could have important implications for intervention efforts. In particular, HIV intervention may benefit from greater understanding of the role of social – and not just sexual – ties, and the identification of YMSM who bridge otherwise unconnected groups with their sexual partnerships. Finally, these data provide some of the strongest evidence linking HIV infection to observed network structure.

Spread Global, Start Local: Modeling Endemic Socio-Spatial Influence Networks

Jeffrey Block (DigitalGlobe)

The importance of social media-borne influence has been demonstrated in dramatic fashion on a global stage, with examples ranging from the regime toppling Arab Spring between 2010 and 2012, to the startling ascendancy of ISIL in 2014. The value of this influence however, is highly versatile in application, and not limited to geopolitics. Commercial marketing campaigns hinge on the propagation of their message through social networks, and social media influence practitioners have engineered methods of ensuring optimal results. This practice however, is often conducted solely in a virtual environment, where false positives can abound due to disconnection from geospatial ground truths. I have outlined a system to reduce network uncertainty and identify key influencers in a manner that improves upon existing analytic processes by geospatially decomposing nebulous social media networks into locally relevant networks, wherein tangible results are more likely. This study introduces a novel approach, demonstrating that position in a social network has bearing on an individual's relationship with others in physical space, and as a result, individuals or organizations postured to influence a network via direct conduits such as local leadership figures and on-site organizers, possess a qualitative advantage. Additionally, because there exists a reciprocal relationship between an individual's position in a social network and their position among others in physical space, geospatial assessment techniques can be used to infer social connections. Dubbed endemic socio-spatial latent variable modeling (ESSLVM), this method has been automated as a Python tool that can be integrated into ArcGIS. Concepts are demonstrated using a Twitter dataset from the late-November 2014 protests in Ferguson, Missouri.

This study's main impetus was proving the conceptual viability of enhancing social network analysis via geospatial means. A major benchmark for this improvement, was the identification of key figures that would otherwise be obscured by ambient entities, if traditional non-spatial or existing minimally spatial social network analysis methods were applied. This study uses commercially available social media influence metrics, social network analysis software, organically developed scripts, and insight derived from a comprehensive review of existing latent variable models, to develop the ESSLVM system and demonstrate its value using real-world social network event data. The efficacy of this model was tested by conducting subjective research on top social media accounts associated with the Ferguson, Missouri real-world vignette. Included research entailed a characterization of key accounts' contributions to the vignette as posted in other public social media outlets, and a comparison of this information to the model's output. Ultimately it is concluded that the application of this form of spatial analysis to social network analysis can be used to identify local influencers more effectively than social network analysis alone, and that specific methods introduced by ESSLVM are conceptually unique.

The Effects of Sexual Network Attributes on HIV Prevalence in rural Uganda

Laura Bloomfield (Stanford University), Ronan Arthur (Stanford University)

Reliable and detailed information about sexual networks is hard to come by and it is rarely paired with the disease status of the individual nodes. In an empirical study of rural farming communities in Western Uganda, we gathered cross-sectional data on the number of lifetime sexual partners an individual has, the age at which they entered the sexual network, their HIV infection status, the dates of their activity, condom use, their geographical location, and the number of strong and weak ties they know are HIV positive. With this information, we infer structural properties of the 9 surveyed villages' sexual and spatial networks to better understand the drivers of the spread of HIV. A follow-up study was conducted one year after the initial data to understand the rate of acquisition of new partnerships within these networks.

The role of ethnicity and social networks in academic achievement and drop-out of high school students

Zsofia Boda (ETH Zurich), Christoph Stadtfeld (ETH Zurich)

The presentation concentrates on students' academic achievement and drop-out, investigating the effect of social processes on academic outcomes. Particularly, we focus on a collection of Hungarian high school classes (with Roma minority students), and examine the role of ethnicity and social network positions in academic achievement and drop-out. We find that (self-declared) Roma minority students are less academically motivated than non-Roma students even in the beginning; and during the 3-year longitudinal study, their drop-out rate is extremely high. In the sample used (12 school classes with at least 10% Roma proportion), 73% of the self-declared Roma students leave their classes by the third academic year. Even though in these groups the drop-out rate is quite high among non-Roma students as well (46%), this value still seems extreme. This difference cannot be fully captured by students' variation in socio-economic status. At the same time, literature on social influence suggests that students' behaviours are highly influenced by their friends; therefore, social networks play an essential role in academic achievement. Peer groups form and maintain social norms that affect academic goals, motivations and behaviours of students. Since in our sample, friendships are strongly related to ethnic groups, peer effect can be partially responsible for the high drop-out rate of Roma students. This presentation contributes to disentangling the effects of ethnicity and social networks on academic achievement in school.

Social Fabric, Time of Day, and Fear of Crime

Adam Boessen (University of Missouri - St. Louis), John Hipp (University of California - Irvine), Carter Butts (University of California - Irvine), Nicholas Nagle (University of Tennessee), Emily Smith (University of California - Irvine)

The notion that social networks play a role in influencing individuals' fear of crime has a long history in criminology, but there is debate about the nature of that role. More ties incident upon a given ego might be associated with more information about criminal activities and hence more fear, but more ties might also be associated with more collective action and thus less fear. Routine activities may also affect fear of crime, with levels of concern higher at night due in part to darkness providing cover for offenders and less availability of guardianship, but less clear is how fear might change at different times depending on the existence of ties and the spatial location of ego and alters. Is it simply the case that all residents perceive more fear of crime at night compared to the daytime, or are there systematic reasons why some persons perceive much more fear of crime at night compared to daytime? In this paper, we theorize that fear of crime might differ depending on the time of day in ways that vary systematically with residents' social networks and the spatial distribution of those networks. To address these questions, we use data from the American Social Fabric Project, a large-scale egocentric network study.

Exchange-based Collaboration in Science: a Theoretical Model

Michał Bojanowski (University of Warsaw)

Collaboration in science can take many forms. Some of these forms, such as providing substantive research input, can be understood as an exchange of resources. We propose a mathematical model of intellectual collaboration that is based on the following assumptions: (1) scholars pursue of science and write scientific publications; (2) each publication consists of a finite set of research components/pieces; (3) scholars are characterized by a finite set of skills that enable them to create above mentioned components, but with varied effectiveness; (4) scholars can form bilateral collaboration ties to pool their skills and work more effectively; What structures of collaboration networks are likely to emerge from such process? We analyze the model analytically and with computational methods. Among other things, we show how complementarity in skills is beneficial, but not a necessary condition for collaboration. We also discuss generalizations for multilateral collaboration.

Measuring nodes' power in multi-layer networks

Nicolás Bolívar (Facultad de Ciencias, Centro de Investigaciones en Ciencias Básicas y Aplicadas, Universidad Antonio Nariño), Rafael M. Gutiérrez (Centro de Investigaciones en Ciencias Básicas y Aplicadas, Universidad Antonio Nariño)

Recently, much emphasis has been put on analyzing networks with more than one layer. This is because nodes in both natural and artificial networks can have more than one attribute, be connected through links that represent different aspects or characteristics, or even those links may change in time. Initially, we are considering two layers in this paper. The first one is analogue to a communication/information network and the second one is equivalent to a physical network. Next, we present a metric that measures a contribution of one layer to the other. This contribution is obtained by assuming that each node can act as a repeater of the received information in the first layer according to the physical distribution in the second. Likening the stress put on each node to its power, we can obtain a ranking of the nodes. Finally, we expand this metric to analyze other types of networks and we compare the results with some standard centrality measures.

Using participants' own smartphones to investigate the role of social networks in mental health

Tjeerd Boonstra (University of New South Wales), Mark Larsen (University of New South Wales), Samuel Townsend (University of New South Wales), Helen Christensen (University of New South Wales)

Interpersonal relationships are vital for our daily functional and wellbeing. Social networks form the pathways by which environmental influences affect individual traits. Numerous studies have shown the importance of social connectivity for mental health, both through direct peer-to-peer influence and by the location of individuals within their social network. Social withdrawal and isolation are key warning signs for episodes of depression and suicidal behavior, but the emergence of this behavior is not always obvious. Passive monitoring using smartphones provides a tool to map social networks and obtain proximal and real time risk indicators.

Most studies have handed out specially programmed mobile phones to participants. However, using people's own smartphones will be critical for scaling up this technology for potential mHealth applications. We developed an application for iOS and Android to collect Bluetooth and GPS data from participants' own smartphones to map dynamic social networks in real life. The app was configured to perform a Bluetooth and GPS scan every five minutes and we used the scanning statistics to quantify the connection strength between participants and define a weighted, undirected social network. Graph metrics were used to quantify the structure of relationships and the position of participants within the social network. We tested the application through a series of experiments to identify potential limitations of the application, to validate the network derived from our app against sociometric badges and to determine the relationship between egocentric network metrics and mental health scores obtained using standard questionnaires.

These studies demonstrate the feasibility of mapping dynamic social networks on participants' own smartphones, whilst identifying some limitations of using generic smartphones. In the presentation, I will discuss some technical obstacles when using participants' own smartphones, such as variations in scanning rate and the use of Bluetooth Low Energy, and the solutions we developed to overcome these limitations. The discrepancies between the social networks derived with our app and the sociometric badges are presented, as well preliminary results on the relationship between network metrics and mental health. The ability to map dynamic social networks using participants' own smartphones offers a non-intrusive and scalable method to investigate the influence of changes in social interactions on mental health and provide users with feedback on their own social connectedness, which fits in the wider trend of using mobile phones for continuous self-monitoring of physical and mental health.

Using network analysis to evaluate leadership development: The LAAMPP Institute

Linda Bosma (Bosma Consulting), Raffaele Vacca (University of Florida), Jaime Martinez (ClearWay Minnesota), Raymond Boyle (ClearWay Minnesota), Rod Lew (APPEAL)

We used social network analysis to assess whether participation in a leadership institute enhanced participants' tobacco control networks. An overview of the rationale for the evaluation design, analysis, and outcomes will be presented. The LAAMPP Institute trains tobacco control leaders from priority populations disproportionately impacted by harms related to commercial tobacco. While many communities and states have established strong tobacco control movements that have realized numerous policy changes and tax increases, communities most impacted by tobacco harms are under-represented in these efforts. To address the need for more tobacco-control leaders from priority population communities, ClearWay Minnesota funded the LAAMPP Institute—Leadership and Advocacy Institute to Advance Minnesota's Parity for Priority Populations, a cross-cultural leadership development institute,

to intentionally recruit potential leaders from Minnesota's priority populations to create cadres of tobacco control leaders within Minnesota communities that experience disproportionate harm from commercial tobacco. LAAMPP is administered by Asian Pacific Partners for Empowerment, Advocacy and Leadership (APPEAL) and focuses on the following communities: African immigrant/African American, American Indian, Latino, Asian American Pacific Islander, and Lesbian Gay Bisexual Transgender Queer (LGBTQ). In addition to developing tobacco control skills and knowledge, a main focus of LAAMPP is to support Fellows to develop the necessary relationships and connections necessary to effectively engage in policy work.

ClearWay Minnesota and APPEAL sought an evaluation that would assess not only knowledge and skills attainment, but examine the Fellows' tobacco control networks to see if they had developed relationships during their time as Fellows that would help support them in tobacco control work both in their own communities and in mainstream settings.

To assess LAAMPP Fellows' tobacco control networks, we used a personal network analysis approach. This enabled us to examine each of the 23 Fellows' individual networks. Data was collected in interviews with the evaluator at the beginning of LAAMPP III and eighteen months later at the conclusion of the Institute. The name generator to help Fellows identify their network was: "Think about the relationships you have in your professional life with people you collaborate with around tobacco control. An important part of developing leadership is the relationships we have and develop—people in our lives who you can turn to for advice or guidance, or to work with to make change. So I'd like you to think about and then name people you know—those who might work with you on a tobacco control effort."

For each alter, Fellows were asked to identify 1) sector, 2) frequency of interaction, 3) type of interaction 4) how influential alter is in tobacco control, and 5) if alters knew each other. We used EgoNet software to organize and analyze the data. Results were averaged across all 23 Fellows to protect confidentiality of individuals. We assessed centrality measures and diversity of composition of networks. At the end of LAAMPP, Fellows' networks were larger, more dispersed, more extensive and more diverse, and included more people the fellows perceive are influential in tobacco control and who are influenced by the fellows' opinions.

Network specificities of circular migrants in rural Senegal

Yacine Boujja (IRD / GWU), Laetitia Douillot (George Washington University / IRD), John Sandberg (George Washington University)

For the last 20 years or so, social networks have held a central place in migration theory. In the empirical literature, however, networks are seen primarily as independent variables influencing both the likelihood and outcomes (such as social integration in the destination) of migration decisions. Little empirical work addresses the question of how migration is associated with differences in migrants' social network structure and their ties to the origin. Those that directly focus on the relationships at origin rely predominantly on qualitative approaches. Though this literature largely suggests that circular and permanent migrants maintain a strong links with the sending community, there is little focus on variation in such ties and virtually none through formal network analysis.

The answer to this question - the heterogeneity of ties to the origin among migrants - may be particularly important to understanding the role of circular and return migrants, whose social networks are split between two communities, in their influence on social and demographic processes in the origin. Using an innovative combination of a new and extensive social network data (The Niakhar Social Network and Health Project, NSNHP) linked to a prospectively collected demographic surveillance system (Niakhar HDSS), we describe in this paper the relationships between circular migration and migrants' social networks in their origin. The NSNHP gathered sociocentric network data for the entire population of one large village in rural Senegal (1310 residents), as well as information on residents' social network ties to those outside the village. The identification and collection of each respondent's ties was conducted through 16 discrete name generators, averaging a total of 27 unique network alters per respondent. Migrants were identified two ways. First, as part of the NSNHP, sample members who had previously been resident in the village but had migrated to and were currently resident in the capital, Dakar, were tracked and interviewed using the main network survey instrument. Second, current residents who had migrated previously were identified using complete migration histories for the past 30 years in the surveillance system. Five distinct categories of migrants were identified for our analysis based on the place of interview, the time of migration (current or past migrant) and the location (Dakar or elsewhere). We then calculated various compositional and some structural network measures (density, betweenness/closeness/degree centrality) and analyzed their distribution across the migrant categories using descriptive and multivariate analysis while controlling for age, sex, education and marital status.

Main results indicate that single, less educated and younger migrant women are on average cited less often by others, generally occupy a less central position in the village's network and have smaller networks. Differences were also observed between the migrant groups showing a possible memory effect on perceived network associated with the place of interview, while less recent migrants only showed minor differences compared to nonmigrants. This globally shows a relative detachment from the community for circular migrants which appears, just like their migration, to be only temporary. There were no significant differences in network density across migrant and non-migrant groups.

Guardians vs Troublemakers: Individual contribution to abnormality in the dynamics of two-mode networks

Julien Brailly (Swinburne University of Technology), Emmanuel Lazega (SciencesPo Paris)

Most methods and models exploring dynamics of networks focus on the regular creation or disappearance of ties between actors. Because these evolutions are stable, they can be considered to be normal. These models allow for exploration of macrostructure reproduction, but not really for understanding its evolution. In this presentation we propose to reverse the perspective by focusing on extreme or abnormal evolutions at an aggregate level. This perspective is particularly interesting for the study of dynamics of affiliation networks between individuals and organizations. From a dual or multilevel perspective, these kinds of networks permit zooming in (at the individual level) and zooming out (at the organization level). Some individuals have abnormal or deviant trajectories and because of their abnormality these trajectories change the system. They contribute to creating new connections that are unexpected or unwanted at the aggregate level. Even if some of these new connections are exceptional, some others are durable and affect the upper level over the long term. This analysis is based on affiliation of judges in chambers at the Commercial Court of Paris from 1990 to 2005. After determining abnormal/deviant and durable/repeated evolutions at the upper level (judges movements between chambers), we study individual judges' contributions to the evolution of the system. Then we point out two important categories of judges who play a crucial role in the dynamics of this two-mode network. On the one hand, some individuals contribute a great deal to the abnormal/deviant evolution at the upper level; they are troublemakers in the system. On the other hand, some individuals contribute very much to reduce system instability; they are the guardians. Whether guardians or troublemakers, these individuals can move alone from one chamber to one another; or they can move several times with the same others judges, revealing a hidden mode in this two-mode network. In order to understand this hidden mode, we study the position of these individuals in the advice network between judges from 2000 to 2005.

Centrality Facing Inequality

Ulrik Brandes (University of Konstanz)

We use notions of centrality that take actor qualities external to the network into account to demonstrate the simplicity and flexibility offered by our recently introduced positional approach to network analysis.

A major assumption ingrained in centrality indices is the substitutability of alters. Mathematically, this corresponds to the common requirement that centrality indices be invariant under isomorphisms. Weights, feedback (as in eigenvector centrality), and valued relations are limited and index-specific attempts to treat different actors differently. We instead present a framework that can be adapted to different research settings. All it requires is the specification of positional dominance based on relevant indirect relations and preferable alter compositions. Both are low-level requirements that can be grounded in domain-specific theories and tested empirically without any knowledge about the subsequent centrality analysis.

Demonstration examples include inhomogeneous communication networks, relations among organizations of varying size and power, and ego networks collected using a position generator.

The Enemy of my Friend is Easy to Remember: Balance as a Compression Heuristic

Matthew Brashears (University of South Carolina), Laura Brashears (University of South Carolina)

Balance Theory has accumulated an impressive record of empirical confirmation at both the micro- and macro-levels. Yet, it is unclear why humans consistently prefer balanced relations when imbalance offers the opportunity to reap material rewards. We argue that balance is preferred because it functions as a "compression heuristic," allowing

networks to be more easily encoded in, and recalled from, memory. We present the results of a novel randomized laboratory experiment showing that memory for relationship valence is more accurate for balanced, rather than imbalanced, networks and that relationship existence and relationship valence are separable cognitive elements. We also present suggestive evidence that humans are implicitly aware of the conditions under which imbalanced networks will be most durable.

The interplay between creative problem-solving interactions and difficult ties in organizations

Julia Brennecke (Swinburne University of Technology), Dean Lusher (Swinburne University of Technology), Michael Gilding (Swinburne University of Technology)

In general, individuals prefer to avoid work-related interactions with others that they have negative ties to. However, exceptions prove the rule and we can still observe multiplexity of positive and negative ties in the workplace. Our study investigates the antecedents and consequences of this multiplexity, focusing on individuals' voluntary engagement in creative problem-solving interactions with colleagues that they find difficult to work with. Integrating the literature on positive and negative networks in organizations, we propose that different network endogenous mechanisms and exogenous characteristics of individuals determine their tendency to seek problem-solving assistance from and provide problem-solving assistance to difficult colleagues. Moreover, we examine the performance benefits of this behavior. To analyze antecedents of the relationship between creative problem-solving and difficult ties, we apply exponential random graph models (ERGM) for multivariate networks to network data on 173 members of the engineering department of a large construction firm. Preliminary findings show that first, different social mechanisms drive the creation of problem-solving and difficult ties among engineers. Second, multiplexity of problem-solving and difficult ties depends on the characteristics of the individuals involved their creation, for instance on their tenure and group membership. Concerning the performance benefits of multiplexity of positive and negative ties, the results of regression analyses demonstrate that seeking problem-solving assistance from difficult colleagues is positively related to performance evaluations of supervisors while providing problem-solving assistance to difficult others is not related to the providers' performance. By showing how positive and negative networks among co-workers interact, this research contributes to the growing streams of literature on negative ties and on relational pluralism in organizations.

When Knowledge and Experience matter. Measuring Centrality in 2-mode Temporal Covert Networks

Chiara Broccatelli (Mitchell Centre for Social Network Analysis, University of Manchester), Richard De Mellow (School of Computer Science, University of Manchester), Martin Everett (Mitchell Centre for Social Network Analysis, University of Manchester), Johan Koskinen (Mitchell Centre for Social Network Analysis, University of Manchester)

How do individuals belonging to covert groups acquire enough knowledge and experience for carrying out all the necessary activities and undertaking their covert intents? They need to learn. The practical knowledge they need not only requires to be transferred to new members but it also must be absorbed and adapted. By doing activities and interacting with others during an event, individuals learn how to independently use this knowledge effectively. First, we start by using the Bi-Dynamic Line-Graph to represent our covert networks. Next, we apply a specific measure of centrality which quantifies the amount of practical knowledge and experience individuals gather through hands-on experience and interactions with others. In doing so, we demonstrate its applicability on temporal covert networks as an example. In particular, we discuss the usability of this centrality measure for empirically capturing knowledge and experience transfer dynamics by considering past relationships and past attendance in covert events. We also seek to demonstrate that this measure gives us an idea of which people mostly benefit from these transfers and mainly contribute to the diffusion of the knowledge. Finally, we suggest that by applying this measure of centrality it seems possible to identify how and to what extent the flow of knowledge and experience evolves and grows over time in covert networks.

Evolution through bursts: Network structure develops through localized bursts in time and space

Hilla Brot (Boston University), Jacob Goldenberg (The Hebrew University of Jerusalem), Lev Muchnik (The Hebrew University of Jerusalem), Yoram Louzoun (Bar Ilan University)

During the last decades, considerable research has been devoted to understanding network formation processes. This research resulted in a number of insightful models of network formation, which can explain and reproduce the most prominent static network properties (degree distribution, clustering, etc.). To reproduce these static properties, most models assume some monotonicity over time and position in the network of the link addition and removal process. We argue that this implicit conjecture is questionable. Using a sequence of snapshots representing evolution of a large online social network, we show that there is a non-intuitive organization of the dynamics of tie addition and deletion: Addition and deletion of links occurs in localized bursts, with seeming coordination resulting in formation of dense neighborhoods. In particular, the densification bursts occur concurrently with a nearly instantaneous increase in clustering among the nodes in the network neighborhood where the addition of links in the region surrounding a pair of nodes is shown to illustrate this process in a set of small network areas). We simultaneously track the co-evolution of the network structure and the local similarity of approximately 8 million users of the largest connected component of an online social network. By leveraging the detailed information about added and removed links and the changing attributes of individual users, we explore the detailed dynamics of the link formation process. We find that the evolution of the social network structure through the addition and removal of network ties (links) occurs through densification bursts. These bursts occur within two hops of the focal node coinciding with a nearly instantaneous increase in similarity and clustering among the nodes in the network neighborhood. Such eruptions of local activity lead to the emergence of comparatively dense local groups of users (designated as communities or clusters in different domains). Our findings provide insight into the mechanisms behind the evolution of communities in social networks, as well as for the full network structure, and have direct implications for network modelers as well as policy planners. In this work, we show that links in social networks tend to added in brief batches of local densification. Link addition and removal does not consist of continuous (monotonic) activity dispersed throughout the network, in contradiction to what is usually assumed. An interesting aspect of these densification bursts is that they occur simultaneously at the network and content level. Most models of network formation have studied either the link addition and removal process, assuming given node content (e.g., homophily-induced link addition; or studied the node content in a fixed network (e.g., dynamical models of neural networks or contact processes; Here we show that in parallel with the processes leading to densification and higher clustering, the attributes of adjacent nodes also become more similar.

Socioeconomic Segregation of Activity Spaces in Urban Neighborhoods: A Network Approach

Christopher Browning (Ohio State University), Catherine Calder (Ohio State University), Lauren J. Krivo (Rutgers University), Anna L. Smith (Ohio State University), Bethany Boettner (Ohio State University)

Recent evidence indicates that residential segregation by income and education is increasing alongside trends of slowly but steadily declining Black-White segregation. Levels of segregation in urban neighborhood residents' non-home activity spaces, however, have not been explored. How integrated are the daily routines of people who live in the same neighborhood? Are people with different socioeconomic backgrounds that live near one another less likely to share routine activity locations than those of similar education or income? Do these patterns vary across the socioeconomic continuum? Moreover, research is silent about how patterns of spatial sorting in routine activities by socioeconomic status (SES) might vary according to the socioeconomic structure of the neighborhoods where people live. We draw on segregation research and network approaches to examine hypotheses regarding variability in socioeconomic (income and education) sorting in the routine activity locations of urban residents. These questions address longstanding issues in urban sociology and current debates on the effectiveness of mixed-income housing in increasing exposures across SES.

The analyses employ unique data from the Los Angeles Family and Neighborhood Survey (L.A.FANS) that identify the locations where residents from a representative sample of neighborhoods in Los Angeles county live, work, shop, worship, visit the doctor, and spend other time. We conceptualize the structure of shared routine activity locations as a multilevel network - household pairs (represented by a randomly selected adult) residing in the same neighborhood (census tract) and examine whether the dyads conduct activities in the same location (census block group). Of central interest is whether neighbors with the same education/income levels (homophilous dyads) are more or less likely to conduct activities in the same places than those with different education/income levels (heterophilous dyads). We also examine whether the role of neighbor socioeconomic similarity or dissimilarity in the co-location of routine activities is dependent on the socioeconomic composition and level of trust characterizing the neighborhood as a whole. The analyses control for a host of dyad-level demographic similarity/dissimilarity covariates (as well as

geographic distance between residences of the neighbor pairs) and tract-level structural characteristics. We employ multilevel p2 models (Zijlstra et al., 2006) to model the probability of a tie through any routine activity location. The logistic regression framework results in coefficients that capture the change in the log odds of a household dyad tie (shared activity location) associated with a given dyad- or tract-level predictor, while accounting for dependence due to the sampling strategy (individuals are nested within tracts) and definition of dyads (individuals are part of many dyads). Results indicate that, on average, increasing household SES diminishes the likelihood of sharing routine activity locations with households from any SES group, regardless of dyad SES similarity or dissimilarity. This pattern is most pronounced in neighborhoods characterized by high levels of socioeconomic inequality. Neighborhood trust explains a nontrivial proportion of the inequality effect on the extent of routine activity location sorting by SES. Thus stark, visible neighborhood-level inequality by SES may lead to enhanced effects of distrust on the willingness to share routines across class.

When Sports Meet Politics: Exploring the Role of Sports Figures in Mizzou Political Action

Matthew Bui (University of Southern California)

This paper explores the intersection of sports and politics, and various definitions and concepts of collective action, connective action, and (online and offline) political action. This is accomplished through the use of the University of Missouri Concerned Student 1950 protests in November 2015 as a case study for the intersection of these issues, and the use of social network analysis (SNA) to investigate 20,206 online posts between 12,043 individuals regarding this series of events. This is a fitting incident for examination because the collective action efforts of Concerned Student 1950 were a seeming success after the university's football team and coach publicly supported campus protests, and a large part of their offline success was due to online processes of information sharing and public participation.

Through testing and illustrating the centrality of sports-related figures (i.e. the Mizzou football team, coach, and Athletic Director) in this communication network, findings regarding the use of social media and sports-affiliated individuals in campus protests and contentious politics were garnered. Namely, it was found that, though a few sports figures did play pivotal roles, it was more likely for individuals affiliated with the organizational leadership of Concerned Student 1950 to be central in the network. Moreover, while the campaign incorporated personalized appeals into its organizing strategy, leveraging personal social media accounts to generate awareness and participation, the most central messages and accounts were posted from accounts for student organizations.

Therefore, the evidence suggests that sports figures can play integral roles in political action efforts outside of the sports world, and it might be strategically advantageous to incorporate student-athletes, coaches, and sports reporters into campaigns of campus collective action. However, the role of sports figures in contentious campus politics and the success of a campaign might be limited. In addition, this study demonstrates how understanding the shifting, and increasingly "individuated" and online, nature of collective action might be more complex than originally detailed in previous models, since organizations appear to persist as significant contributors to these efforts and their successes.

Friendship Selection Patterns among Low-Income Minority Girls/Adolescents: Links to Obesity Risk

Kimberly Burdette (Loyola University Chicago), Amy Bohnert (Loyola University Chicago), Lara Dugas (Loyola University Chicago), David Shoham (Loyola University Chicago)

A growing body of research has argued that efforts to reduce pediatric obesity often fail because they do not consider the broader social context in which adolescents spend their time, such as the adolescent friendship network. Indeed, typical adolescent friendship selection patterns (social exclusion of overweight youth, and homophily based on weight) may maintain and promote obesity risk of overweight adolescents. Research on contexts that facilitate alternative selection patterns, particularly social inclusion of overweight youth and friendship groups with diverse weight status, is thus sorely needed. Summertime programs offer an ideal context for understanding how such selection patterns may be fostered because they bring together many youth who do not previously know one another, allowing youth to regroup into new friendship networks. Furthermore, research suggests that summertime programs facilitate friendships between adolescents who would not normally select one another as friends. This study examined a community-based summer program that promoted healthy lifestyles and primarily serves urban low-income girls of color. Utilizing social network analyses, selection patterns within the program related to weight status and weight-related health behaviors were investigated. Participants were forty-three 10-14-year-old girls recruited from the program. Body mass index and

weight-related health behaviors were assessed before and at the end of the program. Friendship ties were also assessed at the end of the program to capture the friendship network that emerged. Preliminary results using Exponential Random Graph Models suggest that contrary to typical adolescent selection patterns, overweight participants were more likely to establish friendships than healthy weight participants, and participants in the program were more likely to choose friends with different, rather than similar, weight statuses compared to their own. Implications of these results for pediatric obesity prevention and intervention efforts are discussed.

Network change detection and prediction using time series methods

Janis Butkevics (Johns Hopkins University), Ian McCulloh (Johns Hopkins University), Christine Sowa (Johns Hopkins University)

In recent years data collection of large, real time networks has increased due to big data enabled technologies. These networks do not remain static, continually changing due to trends, exogenous change, and various other factors. The ability to monitor such change requires longitudinal analysis of network measures at individual node and graph level. The challenges posed to long term analysis on a mass scale are numerous. Seasonal and cyclical factors strongly affect network measures. For example, an email network monitored daily undergoes various changes such as lower interaction on weekends, increased activity in the mornings and the absenteeism of nodes for various reasons. In order to mitigate the effect of various trends, seasonal and cyclical effects in longitudinal network metric analysis classical time series decomposition and Seasonal and Trend Decomposition Using Loess (STL) are considered. Special consideration is given to understanding common patterns and identifying time series components that indicate abnormal network change. Secondary consideration is given to the possibility of predicting network change given time series patterns and components.

Hamming Trajectory Sampling for Exponential Family Random Graph Models

Carter Butts (University of California, Irvine)

Markov chain Monte Carlo (MCMC) sampling is the workhorse technique of exponential family random graph model (ERGM) and related approaches to simulation and inference for social networks. The current generation of MCMC algorithms employed for ERGM simulation uses a Metropolis-Hastings strategy that leverages the typically low-cost of changescore calculation, but that is known to be prone to poor mixing for many model families. Here, we introduce a novel MCMC algorithm based on sampling from trajectories in Hamming space, that reduces some of these difficulties. Much like slice sampling (to which it is related), the Hamming trajectory sampler is capable of “tunneling” between regions of high probability mass that are separated by low-probability “barriers” that impede mixing for standard single-move MCMC algorithms. As we show, the Hamming trajectory sampler shows improved mixing versus the Metropolis algorithm for some otherwise recalcitrant graph distributions, without losing many of the computational advantages that have made single-move algorithms popular in this context.

Measuring Social Capital Using Network Structure

Joseph Cabrera (University of La Verne), Alyssa Carroll (University of La Verne)

This study examines 30 small groups ranging in size from 10 to 50 members to determine if there is a relationship between particular elements of the network structure (e.g., density, transitivity, path length) and social capital. Social capital is measured in terms of trust and psychological sense of community. Preliminary results suggest that certain factors, such as network density, are strongly associated with higher levels of social capital. There also appear to be different relationships between social capital and network structure depending on how diverse group populations are in terms of socio-demographic variables.

Uptake of methodological innovation in pharmacoepidemiology follows the Diffusion of Innovations model: systematic review and co-authorship network analysis

Suzanne Cadarette (University of Toronto)

Background: The field of post-marketing drug safety and effectiveness research (pharmacoepidemiology) has experienced rapid scientific progress and growth, particularly in the last decade. The rapid increase may partly relate to

the emerging availability of healthcare utilization data, and significant funding investment. The recent investment in pharmacoepidemiology is motivated by the recognition that drug safety and efficacy data from randomized controlled trials are limited, and thus more evidence is needed post-marketing to improve our understanding of drug benefits and harms. Real-world drug safety and effectiveness data are important for patient and physician prescribing decisions, as well as for drug policy decision making. However, methodological challenges in pharmacoepidemiology have required innovative solutions. In our paper, we apply case study methods with the Diffusion of Innovations model (Rogers 2003) to characterize the diffusion of methodological innovation in pharmacoepidemiology. Methods: Case study analysis of the diffusion of two methodological innovations that summarize confounder information into a single score: disease risk score (DRS), and high-dimensional propensity score (hdPS). The innovations represent different time courses (innovation in: 1976 [DRS] and 2009 [hdPS]) and similar, yet distinct types of innovations (new statistical method [DRS] and adaptation of an established statistical method [hdPS]). We completed systematic keyword (MEDLINE, EMBASE), author (DRS only) and citation (Web of Science) searches to identify all DRS and hdPS papers in the field of pharmacoepidemiology through to the end of 2013. We created study flow diagrams to summarize results of each systematic search and Venn diagrams to illustrate search strategy yield. We plotted the number of publications by study type (empirical, methodological, review), and the cumulative number of unique authors by calendar year to characterize the rate of adoption of each innovation over time. Sociograms were generated to visualize co-authorship networks, examine components, and identify influential authors. First and last author affiliations were used to ascribe institutional contributions to each paper, component, and network. Results: The multiple search strategies proved important for DRS, yet only 1 paper was found outside the hdPS citation search. We identified 43 DRS papers by 152 authors since 1981 with 13 components (10 included only a single paper), reflecting slow diffusion during initial periods of uncertainty and broader uptake since 2001 linked to early adopters from Vanderbilt University. We identified 44 hdPS papers by 147 authors since 2009 with 7 components (5 included only a single paper), reflecting rapid and integrated uptake, likely facilitated by opinion leaders, easily accessible statistical code, and improvement in funding opportunities. Most contributions were from North America: 87% of DRS (14% Canadian institutions; 24% Vanderbilt University, 49% other US institutions) and 96% of hdPS (17% Canada; 29% Harvard University, 50% other US institutions). Conclusions: The uptake of methodological innovation follows the Diffusion of Innovations model. Authors are encouraged to consider attributes that may improve knowledge translation of their methodological innovations for rapid integration into practice, and we provide recommendations for consideration.

A Human Vulnerability Index for Interdependent Infrastructure Networks

Kelly Calder (University of Florida), Christopher McCarty (University of Florida)

We present the development of a Human Vulnerability Index as part of an interdependent network model of the power, transportation and communication networks. We used a free-listing task to develop a cultural consensus model around people who interact with vulnerable nodes, such technicians who oversee file servers or critical power infrastructure. These results show that behavior around these nodes share common concepts. We conducted personal network interviews with respondents with high consensus scores and measured the contribution of the composition and structure of their network to their decisions. By combining the consensus and personal network data we will create weights to refine the overall models.

The effects the number of agents has in the formation of networks and statistical analysis on multiple networks

Abel Camacho (URPP Social Networks, University of Zurich), Claudio Juan Tessone (URPP Social Networks, University of Zurich), René Algesheimer (URPP Social Networks, University of Zurich)

While the study of networks has become a very important topic in science; statistical inference on networks is often the product of analyzing a single network. The relevance of their claims is justified by the reproducibility of their results and on the model assumptions. A tool currently used, such as exponential random graph models (ERGM), have been introduced as models that overcome the independence assumption of logistic models implausible in network data. Their estimators have been justified on consistency and on normality approximations as the number of agents tend to infinity. Clearly, this is for many networks difficult to justify, e.g. friendship networks of students in a classroom or even a school, or cooperation network between coworkers in a company. Furthermore, this cannot be assumed when studying the effects the number of agents has on the formation of networks. Here, we present a class of models (that we term finite exponential random graph models, fERGM) that does not assume that the number of agents tends to

infinity and which can be used to analyze multiple networks. fERGM are suitable to perform statistical analyses on multiple networks, and to perform tests for the effect social environment might have on the formation of networks. In this article, we illustrate the power of our approach by applying it to 214 directed networks obtained in four different settings. We do this by testing the effects network size has on reciprocity and transitivity (become a friend of a friend).

Our contribution is fourfold. First, we introduce a network model that does not assume that the number of agents in the network tends to infinity. Second, we develop conditions under which the Maximum Likelihood Estimation (MLE) in fERGM is consistent. Third, we present a general test for effects network size has on network formation processes. Four, we compare the statistical properties of our model and the two-step procedure widely used in multilevel network analysis. Up to our knowledge, this is the first study addressing the statistical properties of multilevel network models. Further, our results shows that the ERGM-parameters strongly correlated with network size; and we provide a theoretical justification of the functional form of this correlation. The latter point is particularly important as previous network studies on multiple networks- that compare estimated parameters across networks or aggregate them in a two step procedures - have omitted to discuss the functional form of the parameters on size,

Two-stage pseudo maximum likelihood inference combining Latent Space Models and Exponential Random Graph Models

Ming Cao (University of Texas Houston School of Public Health), Kayo Fujimoto (University of Texas Houston School of Public Health), Yong Chen (University of Pennsylvania Perelman School of Medicine)

For one single network, as pointed out by Snijders' discussion to Handcock and others (2007), models that combine important features of Latent Space Models (LSM) and Exponential Family Random Graph Models (ERGM) may be the next generation of social network models. Recently Schweinberger and Handcock (2015) showed that the distribution of sufficient statistics in transitional ERGM can be asymptotically normal if some local dependence is imposed. Hence solves the notorious degeneracy problem by satisfying a natural domain consistency condition. Their hierarchical modeling strategy can be informally stated as: cut the whole graph into pieces by clustering methods, then impose your structure of interest within each cluster while assuming independence between clusters. Analogue to longitudinal modeling of independent subjects with correlated repeated measurements, desired statistical properties (consistency and asymptotic normality) can be expected as the number of clusters/subjects became large. However, the Bayesian inference procedure proposed by Schweinberger and Handcock (2015) is extremely expensive in computation, even with moderate sample size. In this paper, we propose a two-stage pseudo maximum likelihood alternative which could be much cheaper. Specifically, at step one, neighborhood structure Z is obtained by latent position and/or covariates, and at step two, this estimated Z is plugged in as fixed and statistical inference is based on this pseudo likelihood function. (Note that historically there are two types of "pseudolikelihood" in the statistics literature, the one here is different from the same terminology in Strauss and Ikeda (1990), which is a multiplication of conditional likelihoods.) We partitioned the whole parameter vector into two parts, namely, the clustering parameters and the association parameters (in ERGM). The uncertainty of the estimated clustering parameters can be correctly accounted for using the results developed by Gong and Samaniego (1981). From inference perspective, such a two-stage procedure leads to more stable results because the impact of the nuisance parameter (i.e., parameters describing the neighborhood structure) on the parameter of interest (ERGM parameters) is minimized; from computational point of view, the proposed procedure is computationally efficient and stable (i.e., less sensitive to the choice of initial values) and is scalable to large studies. The proposed approach is evaluated in terms of its validity and accuracy by the same simulation settings in Schweinberger's paper.

Latent Space Network Models of Statistics Journal Citations

Jane Carlen (UCLA), Mark Handcock (UCLA)

The impact factor as a measure of the importance of academic journals is as widely referenced as it is bemoaned. In their 2016 paper examining citations between statistics journals, Varin, Cattelan and Firth present an alternate metric for journal ranking which is based on "export score". This measure is related to the ratio of in- vs. out-citations of a journal and, importantly, the underlying model presents a measure of uncertainty for export score estimates. While certainly an advance over impact scores, the method is still limited in key ways: 1) Lack of visualization technique for the corresponding landscape of journals. 2) Accounting for clustering and topical similarities between journals (e.g. Biostatistics and Biometrics). 3) Extensibility to include auxiliary data and journals of related fields

with different citation patterns. We use a latent space network model (Hoff et al., 2002) to immediately address the first two limitations, and make inroads to model extensibility. We present and compare our results across the board. This is both an exploration of the citation network of our field and an illustration of the capabilities of latent space models. Finally, we develop computational tools to examine model fit within this context and enhance the power of latent space network models for future applications.

Climate Change and Population Movement

Kathleen Carley (Carnegie Mellon University), Larry Lin (Singapore Management University)

How are the populations of the world likely to shift? What which countries will be impacted by sea-level rise? This paper uses a country-level agent-based dynamic network model to examine how the shifts in population given an ecology of network relations among countries influences overall population change. Networks considered include: alliance networks, shared language networks, economic influence networks, and proximity networks. Scenarios examined include: rise in sea-level, change in child-birth and migration policies, and economic changes. Preliminary results suggest that there could be massive redistributions of population throughout the world. The proposed framework provides a way to begin to explore the interaction between climate change and policy factors at a global level. The simulation model is instantiated using a number of empirical networks based on open-source information. One such network is linguistic similarity. In this case, countries are tied by the languages that are dominant in those countries. Individuals then, when their livelihood is threatened by climate change, are more likely to migrate to those countries which are linguistically similar to their home country; e.g., those from one Spanish speaking country are more likely to migrate to another country with a high volume of people who speak Spanish. Other types of ties, and positive motivations for movement include: alliance and religiosity. Economic ties are treated as disparity; i.e., the greater the difference the more likely people will migrate from the poorer to the richer country, and from more rural countries to those with mega-cities. The confluence of these ties, in conjunction with immigration and child-birth policies then impacts the overall country population growth. Population demographics are considered, resulting in shifts in the age distribution as well as population levels in all countries.

Efficient Incremental Extraction of Social Groups from Real-World Social Network Data Sets

Larry Richard Carley (Carnegie Mellon University), Kathleen Carley (Carnegie Mellon University)

Analysis of Social Network Data in order to extract social groups, also called the community structure, is an important technique for understanding how individual agents interact and for predicting their likely future interactions. To date, most of the effort on grouping has focused on identifying groups given a single snapshot of data. Indeed there are a number of algorithms that have already been developed for extracting group structures from estimates of social network structure; e.g., CONCOR, Girvan Newman, Louvain, etc. However, there are two cases where it is important to identify groups given dynamics network data. Case 1 occurs when there is an existent and unchanging structure, but it can only be observed through a sequence of samples. Case 2 occurs when the network itself is evolving, in which case each data sample provides insight into the changes in the groups. In both cases, incremental network algorithms for identifying groups are needed that account for changes in what ties are observed.

We focus on the computational problem that occurs in the detection of groups, given dynamic network data. The challenge is to detect groups given time variant incremental data, and to do this with as little delay as possible given vast quantities of network data. We propose a novel algorithm for incrementally updating the grouping of social networks based, in part, on observations of communications between agents will be presented. This algorithm is based on prior work on incremental centrality metrics for such data sets. The execution time and memory requirements of the new algorithm will be compared with the execution time and memory requirements of standard conventional grouping algorithms when applied to a number of real-world social network data sets. In general, when it is necessary to reanalyze the data set to extract the group structure frequently, in order to minimize the delay in detecting significant changes in the group structure, the proposed algorithm typically offers more than an order of magnitude decrease in execution time with only a modest increase in the memory requirement.

Changing Allegiance: Insider Threat and Inadvertent Leaks

Kathleen Carley (Carnegie Mellon University), Geoffrey Morgan (Carnegie Mellon University), Nikhil Behari (Carnegie Mellon University - intern), Neal Altman (Carnegie Mellon University), Andrew Moore (CERT)

Infamous incidents surrounding Snowden and Manning illustrate how insiders can compromise governments and organizations. However, all information leaks are not intentional - such as when personnel accidentally reply all and include confidential information. In both cases, studies point to psychological factors or conditions such as the desire for revenge or information overload; or physical factors or conditions such as the desire for money or multi-tasking. While such factors play a role, they are not a sufficient explanation; nor, do they discriminate between insider threats and inadvertent leakers. Similarly, a focus on intrinsic versus extrinsic motivations has not proven to be explanatory. In contrast, we propose a network based approach. We argue that becoming someone who will be an insider threat is a social risk that evolves even as the individual's position in the social network evolves. Whereas, such network evolution is not needed for inadvertent leaks to occur. Different types of motivation - such as wanting to feel a sense of belonging or what to feel influential can lead individuals to evolve their networks by developing structural holes. This reduces constraint and enables insider threat activity.

This argument is shown using three complimentary sources of data and analyses. First, a detailed text- and network analysis using public source data on a few well document espionage cases. Second, a machine learning model using Enron data. Third, an agent based simulation. In all three cases we consider individual, organization and network effects. We find evidence that threats and not leakers have networks that evolve to isolate them. We find evidence that threats and not leakers have a goal to work the system for personal gain.

An important implication of this work, is that organizational process can be effected to reduce risk to both forms of threat. For threats - inclusive engagement is key. For leaks - increase in structure is key. Such interventions have the potential to increase security.

Peer learning networks in global health: an innovative approach to improve primary health care in Africa

Emily Carnahan (PATH), Chilunga Puta (PATH), Balwant Godara (PATH), Kalenga Kakombe (PATH)

The aim of this presentation is to understand the added value of peer learning within and across countries in Africa to improve health systems and services. The hypothesis is that a lack of interaction and information exchange among health care practitioners in Africa limits the effective development and dissemination of user designed innovations to improve primary health care systems. Peer learning networks facilitate connectivity between individuals facing common challenges to both design and deploy solutions. PATH, an international NGO, is applying the principles of peer learning to primary care delivery through the Better Immunization Data (BID) Initiative. We launched the BID Learning Network (BLN) in May 2014 to bring countries together to identify shared problems, design common solutions, and connect with peers.

This presentation will cover both the peer learning design principles used in this initiative, as well as the methods employed to measure the ability of the BLN to effectively connect individuals with the aim of improving primary health care. The design principles were based on an initial landscaping and literature review and the structure is organized by three tiers of demonstration countries, design countries, and discussion countries. Methods to assess the BLN include monitoring of participation in formal BLN activities (webinars, meetings) as well as informal communication channels (Google groups); triannual online surveys of BLN participants to measure engagement, changes in knowledge and skills, and relevance of BLN activities; and annual social network analysis surveys. Cross-sectional time-series data are being collected from BLN members to describe how the structure of the network changes over time in terms of density, centralization and diversity, and how these changes are related to network- and node-level outcomes. An initial round of social network analysis data collection is taking place in December 2015 - January 2016, and results will be shared as part of the presentation.

Peer networks create relationships between individuals that would not exist otherwise, allowing individuals to efficiently exchange information and learn from others' experiences which will accelerate progression to designing appropriate solutions. Receiving input from across countries ensures that solutions are applicable to multiple contexts, permitting adoption at substantially reduced cost and effort. The peer learning design principles and measurement methods used in this initiative can be applied to other programs to improve primary health care delivery in Africa.

Disentangling religious homophily in adolescent friendship networks

Harrison Carter (University of California, San Diego), Kevin Lewis (University of California, San Diego)

Homophily has long been identified as a foundational principle of human interaction, and scholars have noted the pronounced importance of religious similarity as a predictor of friendship. Due to limitations in available data, however, we have a relatively poor understanding of how exactly the mechanism of religious homophily works. In this paper, drawing on data from Add Health and (in part) on exponential random graph models, we address the following three questions: First, what is the relative importance of religious homophily among adolescents, compared to other bases of similarity? Second, what aspect of “religious similarity” is driving friendship: identification, practice, and/or belief? Third, beyond its importance for dyadic interaction, to what extent does any dimension of religious similarity explain the emergence of cohesive peer groups? We focus in particular on two large (saturated) schools in the Add Health dataset and suggest directions for additional exploration.

Social Capital: concepts and measures applied to the study of Brazilian scientist’s performance.

Lidiane Carvalho (Fundação Oswaldo Cruz - Fiocruz), Regina Maria Marteleto (Instituto Brasileiro de Informação em Ciência e Tecnologia- Ibict)

Introduction: The objective of this research is the operationalization of concepts and measures that deal with expressing the progressive mobilization of capital of a network of scientists in the life science field in Brazil. Data were collected from their shared co-authored publications. The approach used for analysis was of the egocentric networks. Methods and Instruments: Data were extracted from lattes platform (open data) using the software open source “Script lattes” and the data reference is twenty years of scientific activity of the researchers involved. The “Lattes Platform” is a tool created by the Brazilian government to gather information about the scientist’s activities in the country. The network centrality measures were calculated in Ucinet and visualization of the network made in Vosviewer - software developed by the University of Leiden Netherlands. For methodological theoretical interpretation of the data we used the concepts the field and capital of sociologist Pierre Bourdieu. Preliminary Results: The survey results indicate that the Brazilian scenario the capital of an active scientist in research in the field of life sciences is associated with the following attributes: 1) ability to mobilize master students and doctoral degrees in research; 2) heads of laboratories at universities public; 3) financing of projects by the National Research Council CNPq.; 4) participation in global genome projects. Preliminary conclusions: The performance of a scientist depends on social mobilization economic, political and priority in scientific discoveries. The capital in scientific networks follows standards and values of the scientific field and is associated with intellectual authority of the scientist and the ability to mobilize human and material resources to develop out the research.

Filipino Nurses, Domestic workers, and Careworkers in New York City and London: Networks, Mobility, and Integration

Rizza Kaye Cases (University of Trento, Italy)

The concept of social network is a useful heuristic in trying to understand the transnational ties that migrants develop, sustain, and/or transform not only in taking the decision to migrate and making it happen but also in their varied attempts at “home making” (Espiritu, 2003) in a foreign land. Migrant networks, then, contribute significantly in the reproduction and self-sustaining process of migration, which should be considered apart from the roles played by labour market demand and supply or the state-led deployment of overseas workers. Past studies have also recognized the crucial role network connections play not only in facilitating the movement of potential migrants but also in serving as a resource both for the migrants settling in a new place (e.g. finding a job) and for those they left behind (through remittances that migrants provide).

This study focuses on Filipinos workers in London and New York City, particularly in three types of occupations in the caring sector - nurses, careworkers, and domestic workers. Comparing these occupations with varying levels of prestige allows us to examine to what extent the networks that they initially have and those they develop over time are similar or different. Furthermore, comparing differences between Filipino migrants in two global cities also highlights the embeddedness of migrant networks within the larger historical, structural, and policy contexts of both sending and receiving countries.

Methodologically, it has been noted by previous researchers that collecting personal network data entails a heavy burden to the respondent as it not only requires to list relevant people and their characteristics but also to evaluate the ties between those people they listed. Another issue to consider is the tendency to inaccurately recall all relevant connections. For instance, respondents mostly remember those they have recently in contact with but tend to forget the relationships that are distant in time.

In this study, I employed several strategies to minimise the issues mentioned. In order to reduce respondent burden and to aid respondents' memory, I utilised network mapping and visualization both in paper-based and electronic formats depending on the respondent's preference and the given interview situation. The software package VennMaker was used for the digitized version. The diagram is comprised of four concentric circles corresponding to the level of importance.

Though not technically a longitudinal study, I attempted to reconstruct changes in migrant networks through retrospection by asking for a particular network in each migration phase (before coming to London/New York, initial settlement, and further integration). While eliciting these networks by embedding them within migrants' narratives does not entirely eliminate the problem of forgetting, I argue that doing so enhance the ease of recall of relevant ties thereby providing a better understanding of migrant networks. Studying how migrant networks form and evolve in different migration phases opens up the possibility and potential for examining transnational engagement and participation.

Figurational approach to network dynamics: analyzing qualitatively the evolvement of marital networks

Anna-Maija Castren (University of Eastern Finland)

In this paper a figurational approach is applied to qualitative analysis of network dynamics in a longitudinal research setting. Figurational approach draws from Norbert Elias's notion of figuration that combines insider and outsider perspectives to relational dynamics indicating that both the subjective view of research participants expressed, for example, in qualitative interviews and the relational setting delineated with network analytic tools are considered as significant. Understanding personal sense-making of research participants informs us about relationships as lived and experienced, while analyzing relationships as embedded in webs of relations gives insight into the structural dynamics constraining individuals.

In the paper figurational approach is applied in a longitudinal analysis of young couples' social networks in the early years of marriage and in the evolvement of a marital network. Data consists of information on social networks of 13 Finnish couples of opposite sex in their first marriage. Data is collected at the time of wedding (phase 1) and after three to eight years of marriage (phase 2). In the first phase couples were interviewed together. In addition to qualitative interviews, detailed information about all guests invited to couple's wedding were gathered with questionnaires including also structural information on interconnectedness of alters. In the second phase partners were interviewed individually and name generator questions were used in qualitative in-depth interviews to elicit alters significant in everyday life. After completing interviews with both partners, couple's lists of alters were put together as one marital network and detailed information on alters and their interconnectedness were gathered with questionnaires.

The paper discusses qualitative network analysis as a research practice that in the figurational approach takes the shape of a dialogue between different analytical perspectives. I will draw on an analysis in progress and thematically focus on changing interdependences in marital networks. Different kinds of data are used: personal narratives on significant relationships, structured information on alters and ego-alter -relationships, and structural information on interconnectedness.

The analysis shows how at the time of wedding couples' networks were composed of rather independent and unconnected elements (for example, her and his friends, her and his family), whereas after few years of marriage and in many cases also after the birth of one or more children, the networks had grown more connected. Such structural changes are compared to the ways in which relationships were narrated in two time points and to the formation of a family unit, a "we", in research participants' personal sense-making.

The paper highlights the ways in which Elias's theoretical notion of figuration can be used to bridge different analytical perspectives in qualitative analysis and it aims to offer ideas on how to work with qualitative and structured data in theoretically inspired ways.

Differential Use, Differential Meaning: Race and Community Structure on Twitter

Nina Cesare (University of Washington)

Users' expectations for their social media experience - which in turn may influence how they navigate and understand a particular space - may be associated with their race. Given this probable relationship, this project seeks to examine the relationship between the race of a user and the way in which they experience Twitter as a social space. Specifically, it considers whether there are racial differences in the ability of users to form community within this site. Twitter's structural features and documented usage patterns make it a particularly interesting space for exploration. For one, ties on Twitter are directed and profile content is variable, which permits users to engage in a variety of community building and/or information seeking/broadcasting behaviors within this space. Additionally, existing research suggests that race may be salient within Twitter as a social context. According to existing Pew reports, Twitter is and has been disproportionately popular with Black and Hispanic users. This preference may be tied to the ability of black and Hispanic users to connect with others and form community within Twitter. In addition to this, existing research on "Black Twitter" suggests that black users may use Twitter as a space to find intention-based communities and connect with others who have similar racial identities and similar concerns. What remains to be addressed, however, is whether on a structural level there are significant differences between how black and white users participate and find community on Twitter. To answer this, this project will explore structural, usage and conversational differences between users of different races on Twitter. Approaching the concept of "community" on Twitter from a variety of perspectives, it will consider racial differences in community building according to a.) commonalities in site usage within users' egocentric networks b.) measures of triadic closer and tie mutually within these networks and c.) conversational consistency within these networks. In doing so, this work will provide much needed insight into the presence of racial disparities within social media spaces, and will highlight diversity in users' social media experiences which other research that utilizes digital data often disregards.

Strategies for Cleaning and Merging Social Network Data from Multiple Sources

Matthew Chandler (University of Notre Dame)

Methods for gathering large amounts of social network data are advancing rapidly, but gleaning quality information from raw data is still an arduous task, especially when piecing together data from multiple sources. This presentation gives some concrete strategies for creating good, clean datasets of large dynamic social networks out of messy raw data on actor characteristics and interaction events. The data in the example case come from the NetSense Study at the Interdisciplinary Center for Network Science and Applications at the University of Notre Dame. The presentation will cover several challenges the NetSense team had to overcome when cleaning and merging data from 6 waves of ego-network surveys and 7.5 million records of telephone communication collected for 200 study participants over the course of 3 years. In particular, it will explain the techniques used to identify distinct alters named across the ego-network surveys and match them to the phone records, in order to generate a complete dataset of dynamic edge activity with vertex attributes. Straightforward string pattern matching was impossible because of pervasive inconsistencies in participant-generated information on alters, so supervised machine learning and fuzzy logical techniques were used instead. Programming code examples will be in the Wolfram Language (implemented in Mathematica 10.3), but the presentation will conclude with practical recommendations for managing similar challenges regardless of one's language of choice.

Integrating Approaches to Place, Time and Social Networks Using Agent-Based Modelling

Edmund Chattoe-Brown (Department of Sociology, University of Leicester), Laurence Droy (Department of Sociology, University of Leicester)

From the perspective of lived experience, it is "obvious" that much of what we do involves moving in a more or less planned way from place to place (home, work, cinema and shopping centre for example). For face-to-face interactions at least, these locations and their timings constrain whom we may meet and thus who is likely to constitute our overlapping social networks through time (though in addition, we can remain in contact through non face to face means and deliberately "construct" meetings at particular times and places - a dinner party for example.) Part of the challenge of realizing this insight from lived experience is that relevant theories and data have been fragmented

across a range of methods and substantive disciplines (social network analysis, time diary research, geography and in particular so called time or space-time geography, epidemiology, transport research, psychological research on friendship/small groups and visualization techniques).

This paper presents a basic Agent Based Model that demonstrates how these diverse insights can be integrated and, when combined with the distinctive methodology of Agent Based Modelling, gives rise to testable “interdisciplinary” models of social behaviour. For the purposes of this paper, the most important novelty of the methodology is the separation of calibration and validation processes. A set of data based assumptions about how individuals meet and plan their time (based on time diary and transport data for example) is “unfolded” by the computer programme to generate a set of dynamic behaviours that include evolving network structure. The argument goes that if this simulated network structure resembles real network data then this may be because the Agent Based Model has captured aspects of the real social process underlying the observed patterns. This can be distinguished from statistical approaches in which validation (model “fit”) cannot really be carried out separately from calibration because model parameters typically do not correspond to things that can be observed or accessed by questioning.

Apart from a substantive contribution to models of networks in space, the paper also demonstrates the distinctive advantages of Agent Based Modelling as an approach to understanding complex systems (those where individual actions are mediated by social and institutional contexts giving rise to results which are often counter-intuitive in aggregate) and shows how its methodology can give rise to testable hypotheses about social behaviour. At the same time, the model serves as a case study for the challenges arising from interdisciplinary synthesis of approaches and in particular with the ways in which different fields attend to different kinds of data which may or may not give a synoptic view of the problem.

The Emergence of Business Networks in an Emerging Biotechnology Sector: The Case of Taiwan

Shihhsin Chen (National Chiao Tung University), Wei-Ting Lin (National Chiao Tung University), Duenkai Chen (Tamkang University)

Literature maintains that geographical proximity has strong impacts on enhancing interactive learning and innovation in the regional clusters (Howells 2002). However, what is less clear is how do interactions occur in the networks to develop linkage between actors and does co-location of these actors enhance the collaborations in a science-based high-tech sector? To explore the associations that regional cluster brought to enhance the formation of R&D networks, this paper examines the R&D collaboration network of the biotechnology industry in Taiwan between 1998 and 2013. Applying social network analysis on a longitudinal dataset gathered from financial reports of the 125 biotechnology firms who have initiated public offering (IPO), this paper aims to explore the R&D collaboration networks between the firms and the non-firm actors in the innovation system to understand whether geographical co-location would enhance the R&D collaborations in the high-tech science-based sectors. The finding of this paper argues that, while the nascent sector remains small in size, geographical co-location is not the most important factor to determinate the networking establishments between the actors in the innovation system. In contrast, the fit of specialties, the mutual complementarities of the business, and the technological proximity between the actors are the key factors to drive the formation of collaboration networks and alliances in the biotechnology sector - a science-based sector. To further enhance the collaboration network in a nascent science-based sector, geographical co-location between the actors may not be the mostly efficient enhancement. Instead, the strength of local knowledge base and the technological proximity between the actors would be the most important enhancements to strengthen the local collaboration networks and the knowledge transfer in the networks. Future policies may need to boost more partaking between the actors through motivating the transmission of knowledge capital through enticement and building attentiveness.

Online Political Media: Twitter activity on the run-up to the Scottish Referendum

Dimitrios Christopoulos (MODUL University Vienna), Juergen Pfeffer (Carnegie Mellon University)

The case: The Scottish referendum for independence from the United Kingdom was held on the 18th of September 2014. What was assumed to be an easy victory for the unionist cause became quite ambivalent on the final weeks of the contest, eventually won by them with a 55% majority. A number of commentators (Cairney and McGarvey, 2013; Keating, 2014; Sharp et. al, 2014) viewed this period to be a critical time for Scottish devolution, even before there was any indication that the status quo may be upset.

The data & analysis: From the Twitter Decahose (a random 10% sample of all Tweets), we collected ~900,000 Tweets containing the hashtag “#indyref” from ~175,000 users in the time period of Jan 1, 2013 to Sep 30, 2014. We focus our analysis on networks constructed from Twitter users mentioning other users in their Tweets. These communication networks show a low level of reciprocity indicating a high level of users talking “to” instead of “with” each other. Based on the dominant use of hashtags from the yes/no campaigns we classify users into these two groups and reveal that most reciprocal interaction happens within the two groups. However, we also find “activists” predominantly interacting with different-minded users. In an overtime analysis we study the change in networks as the two campaigns unfold and we also use real world events (e.g. publication of polls) and show their impact on the Twitter networks.

Understanding the different networks on social media

Kar-Hai Chu (University of Southern California), Daniel Soto (University of Southern California), Kayla de La Haye (University of Southern California), Thomas Valente (USC), Tess Cruz (University of Southern California), Jennifer Unger (University of Southern California)

Social media sites such as Facebook and Twitter have offered an abundant amount of network data for researchers to study concepts such as tie strength or information diffusion. However, these sites are built with inherently different properties, which in turn, leads to the organic development of different types of networks. Friendship ties are not the same across sites, and structural differences can cast individuals into different roles depending on which site they are situated in. We present an example of how to sample data from topic-specific networks on two social media sites, Twitter and Instagram. We explore the differences between the sites and how they must be accounted for in each network. Our strategy takes advantage of the unique features of each site, and combines that data with site-agnostic network analysis tools, including community detection and key player algorithms.

Rightsizing Network Analysis for Social Impact Assessment: Matching Strategic Questions to Evaluation Practice

Wendy Church (ORS Impact), Jane Reisman (ORS Impact)

Social impact networks are often associated with systemic change efforts related to such things as collective action, advocacy and policy change, social capital development, and leadership initiatives of varying scales. Philanthropies, nonprofits and other actors who are interested in engaging in these long-term change efforts frequently employ network formation and growth as a cornerstone strategy. Evaluating the health, impact and durability of networks is therefore critical to both understanding network value, and informing improvements and necessary network supports over time towards maximum social impact.

There is a dearth of resources that directly addresses techniques to use for data collection and appropriate analytic techniques in the applied area of social impact evaluation. This is particularly true in the case of network analysis. This paper is intended to help address that ‘application gap’ by sharing applied theory and lessons learned from a set of social impact network analysis efforts. We present here considerations for rightsizing network analysis for practical application in the social sector. We draw from a variety of small and medium-sized networks including 1) a collective impact network in an environmental initiative; 2) a cross-sector network formation effort between housing and education entities; 3) national leadership networks related to community engagement; and 4) a regional network related to grassroots leadership development. We explore the important variations among these efforts in matching the strategic questions of interest in each case with relevant and appropriate network analysis techniques. Included are question formation, data collection, analysis, metrics, and visualization. We also suggest appropriate and practical models as frameworks for the analyses, and share how other qualitative and quantitative data inform the network analyses.

Command-and-control agility under adversarial conditions

Ertugrul Ciftcioglu (IBM Research), Siddarth Pal (Raytheon BBN), Kevin Chan (ARL), Ananthram Swami (ARL), Derya Cansever (CERDEC), Ambuj Singh (UCSB), Prithwish Basu (Raytheon BBN)

Efficient flow of command-and-control (C2) through social networks is critical for the execution of certain network functions. Examples include finding and routing queries among experts for troubleshooting of technical problems;

and chain-of-command hierarchies in civilian and military organizations. While static predefined networks for C2 are the norm, modern organizations often want to adopt less rigid structures that vary over time for faster operational tempo to achieve some common purpose. A usual reason for such adaptation is when this common purpose is in conflict with another entity's purpose, hence the presence of an adversary, who is continually trying to disrupt links in the existing network to put it in a non-functional or suboptimal state. An adversary can disrupt a social link by disrupting the physical communication media over which the social relationship thrives. Alternatively, he can inject spurious messages and attempt to weaken the tie. If the adversary can disrupt critical links in the social network, the information flow properties of the network can change substantially. For example, the disruption of a bridge link between two communities will completely stop the information flow between them. Similarly, if one of the two existing bridges is disrupted, certain information may stop flowing between the communities or the endpoints of the surviving bridge may get cognitively overloaded, thus resulting in a significant disruption to the information flow patterns. This dynamic of a network designer and adversary is applicable to a variety of operational networks, particularly in C2 environments. The C2 research domain uses the definition of agility as the means to successfully effect, cope with and/or exploit changes in circumstances. We study the capability of network-topological maneuver as a means for an organization to switch between various organizational topologies in order to increase its performance in the presence of an adversary. As an extension to this concept, we note the dynamics of organizations and the environment, both components of a large, complex system that is constantly evolving. Therefore, we study the efficacy of a strategy to maneuver between a set of policy-compliant topologies (e.g., organizational policies can forbid salespersons to form links unless their supervisors are connected) in the presence of an adversarial attack. We capture the tension between an adversary and a designer using non-cooperative game theory. The designer is faced with the dilemma of defending an existing link under attack or growing the current network to the next best topology, while the adversary is faced with the dilemma of which link to attack. We show the existence of mixed strategy Nash Equilibria and systematically study their properties. We study the effect of parameters such as the probability of a successful attack and characterize the steady state behavior of the resultant Markov Chain. While the intuitive adversarial strategy here is to attack links added early in the topology sequence, the best equilibrium strategy is for the designer to defend the earlier links and for the adversary to attack the later links. We validate these properties through several use cases with exemplar network topologies.

Network analysis, social support, and mental health in college students: An examination of the literature.

Heather Clark (Texas A&M University), Rhonda Rahn (Texas A&M University), Meagan Shipley (Texas A&M University), Ledric Sherman (Texas A&M University)

There is an abundance of evidence supporting the deterioration of the mental health of college students. This transitional time for young adults comes with many challenges, and the mental health needs of this population is a growing concern (Hunt & Eisenberg, 2010). Within the last 12 months, 48% of college students felt things were hopeless, 86% felt overwhelmed by all that they had to do, 57% reported overwhelming anxiety, and 35% felt so depressed that it was difficult to function (American College Health Association [ACHA], 2015). In addition, the number of college students with diagnosable mental health conditions is also on the rise. From 2010-2015, students diagnosed with anxiety, depression, and panic attacks all increased. Students with anxiety increased from 10% of students to 16% of students, depression increased from 10% to 13%, and panic attacks increased from 5% to 7% during that time frame (ACHA, 2010; ACHA, 2015).

College students with lower quality social support are more likely to experience mental health problems (Hefner & Eisenberg, 2008). Therefore, this study sought to examine if social network analysis had been used to examine social support of undergraduate college students and how results were used to design effective interventions. This session will present results from a scoping study regarding the use of network analysis to measure social support in undergraduate college students. Originally, a systematic literature review attempt yielded too few results following the examination of more than 400 abstracts. Scoping studies vary widely in their definition, but aim to provide an opportunity to review literature in a certain research area, "especially where an area is complex or has not been reviewed comprehensively before" (Arksey & O'Malley, 2005, p. 21).

Which Authors of ICANN Documentary Information Disclosure Policy Requests Are Likely to Receive Defined Conditions of Non-Disclosure in ICANN's Response?

Sarah Clayton (University of Southern California)

Most homophily studies have focused on individuals, rather than organisations. Research has demonstrated that homophily patterns increase as the number of distinct relationships between two individuals increase; hence, there's more homophily in multiplex networks than simplex networks. The Internet Corporation for Assigned Names and Numbers (ICANN) passed the Documentary Information Disclosure Policy (DIDP), its version of the the Freedom of Information Act, in February 2008, to "ensure that information contained in documents concerning ICANN's operational activities, and within ICANN's possession, custody, or control, are made available to the public unless there is a compelling reason for confidentiality" (ICANN, 2008, p. 9). ICANN must respond to DIDP requests within 30 days and information and documents may be withheld if the requested information falls under one or more of ICANN-identified 12 Defined Conditions of Non-Disclosure (DCND). These essentially provide an administrative loophole for ICANN to restrict the free flow of information. The present research examines status homophily in relation to DCND cited by ICANN in response to DIDP requests from organisations and individuals. It compares the 91 DIDP requests, submitted to ICANN between September 2008 and September 2015, to the DCND invoked in their responses in relation to the attributes of each request, including organisation type (e.g. internet non-profit) and word count. Shared DCND (edges) connect the 91 DIDP Request IDs (nodes). As it is not possible to fit an exponential random graph model (ERGM) to a multiplex network in R, undirected, unidimensional networks are constructed for four separate categories of DCND: Affect Individual, Burdensome, Compromise ICANN Integrity, and Confidential External Business Information. Statistical p^* models demonstrate that lengthier DIDP requests tend to receive greater numbers of DCND, which implies that longer submissions ask for what ICANN considers as contentious information. ICANN stakeholder groups/working groups are more likely to receive conditions in every condition category, except Affect Individual, which suggests they request quite sensitive and/or contentious information. It is rare for Burdensome conditions to be imposed on law firms, as they have a tendency to request precise information in relation to a specific case, rather than excessive or unreasonable quantities of information. Registrants are less likely to receive ICANN Integrity conditions as they are more concerned about their own domain name registrations than the inner-workings of ICANN. Further, Confidential External Business Information conditions are less likely to be imposed on internet non-profits, as they tend to be interested in ICANN's interface with internet governance and other related concerns, over third-party business interests. Altogether, the results support the idea that DIDP requests with a higher word count receive more DCND, and in many cases individuals and organisations that fall into the same category/industry sector receive similar DCND. The findings have implications for prospective DIDP requesters and enhancing ICANN's transparency and accountability processes.

Association of Community Norms with Willingness to Intervene in Bullying Among Early Adolescents

Benjamin Colaiaco (Pardee RAND Graduate School), Harold Green (RAND), Dorothy Espelage (University of Illinois), Brett Ewing (RAND), Kayla de La Haye (University of Southern California), Michael Pollard (RAND), Joan Tucker (RAND)

In this study we aimed to explore the differential impact of peers and communities on willingness to intervene among adolescents through a multi-level peer context. Each year more than 25% of all 12 to 18 year old adolescents fall victim to bullying, which occurs most frequently among early adolescent. Victimization can lead to significant delays in social, emotional, and academic development. A promising new approach is to examine bullying in the context of broader social dynamics by focusing on reciprocal relationships between individuals, as well as the influence of peer groups, providing insight into how adolescents' social networks shape bullying and defending behavior and how those relationships can be leveraged in anti-bullying interventions. It stands to reason the features of broader peer social structures, such as membership in particular structurally well-connected groups, are likely to shape the relationship dynamics among pairs and small peer groups, and therefore are likely to impact adolescents' willingness to intervene. However, the current body of research has yet to consider how these larger structures influence willingness to intervene through observation, social learning, and mimicry of social norms.

We collected four waves of data from three Illinois schools focusing on students in their early adolescence. At each wave, respondents nominated up to eight friends. We measured willingness to intervene using the University of Illinois Willingness to Intervene Scale. The 5-item, self-reported measure asks students the extent to which they agree with five statements regarding intervening when they encounter an episode of bullying. Community membership analyses were based on the social network adjacency matrices generated by participants' school-based friendship nominations.

We identified communities within each network employing the edge betweenness algorithm, which is an approach to maximize Girvan-Newman modularity (i.e., a community has greater proportion of internal connections relative to external connections). The algorithm uses an iterative process, removing edges from the complete network to arrive at a set of mutually exclusive community groupings. To estimate the relationship between community-level effects on an individual's willingness to intervene during an episode of bullying, with individuals nested within communities and communities nested within schools we constructed separate hierarchical linear models at each study wave with individual, family, neighborhood and community level predictors.

We found consistent and significant positive relationships across all four waves of data between the mean community willingness to intervene score and an individual's willingness to intervene. We also found during two of the waves (wave 1 and 3) a larger proportion of males within a community predicted a greater likelihood that an individual would be willing to intervene. Individual-level characteristics within our social norms context remained fundamentally consistent with the extant literature. The significant association between an individual's willingness to intervene and the willingness to intervene of his/her community members highlights the importance of extending the focus of anti-bullying interventions beyond broad school-level norms-based interventions and tightly focused individual and peer-group interventions to community-focused interventions within schools.

On the role of informal personal networks in explaining technical education student drop-out

Carlos Contreras-Ibáñez (Universidad Autónoma Metropolitana, Iztapalapa)

Historically, public budgets for education in Mexico are one of the highest in the OCDE context. However, system and student performances are not in line with that expenditure, obtaining some of the lowest marks in key indicators, one being elevated levels of student drop-out in tertiary and post-secondary education. These figures are even more severe for technical and professionalizing education students, due to a lack of social valuation for that educational subsystem in some contexts and regions, in favor of university degrees. In general, while keeping at school has ceased to be the economic upgrading path once was for young Mexicans, due to restrictions for the labor market to absorb graduated people, is still true that finishing a whole educational cycle increases personal, familial, and communitarian well-being, as well as corresponding social capitals. Recent research has begun to emphasize more dynamical factors for this post-secondary school drop-out phenomenon, additional to the established explanations based in poverty and social inequalities. Here, as a proximate cause of drop-out we explore three types of interactions among adolescent with his/her peers and with other relevant persons, including family members: in terms of informal conversations about academic issues, of perceived expectations of achieving at school, and of work role models in the case of adult alteri. In the context of a Conalep technical school in East Mexico City, we evaluate personal networks of 443 students from both sexes and aged from 16 to 20 years old, obtaining network descriptors related to size, density and composition for the three personal sets of contacts. More important we obtained data, after the school year finished, about students who effectively dropped-out, so we can model network variables (compared to other, cultural and attitudinal) which can explain school behavior in those adolescents. This poster shows descriptive and exploratory statistical analysis on this regard, with the general finding of the number of adults with low skilled work serving as role models for job being the principal factor for having a higher risk of premature leaving of school in this sample, in line with social capital literature on job market entry, and above other also significative factors such as the lack of subjective support represented for keeping no conversations about school issues, and low expectations perceived for achievement in school. Both of the last mentioned factors are a common coin in academic research for explain drop-outs, but on the contrary, this research finds no support for consider them relevant. As such, this research contribute to reframe academic trajectories of students into general models of social network dynamics based in homophily and influence, leaving space for new questions for academic system performance evaluations.

The Meaning of a Close Tie: Social Network Name Generators and Conceptions of Closeness

Molly Copeland (Duke University), Josh Bruce (Duke University), Maria Cristina Ramos Flor (Duke University)

Many social network surveys employ the idea of 'closeness' to generate ego-network data, with a substantial research literature across several domains, such as theories of social support or strong and weak ties, relying heavily on closeness. Consequently, a variety of surveys incorporate closeness, often by asking respondents to list their closest friends, or those to whom they feel particularly close. Despite ample investigation into methodologies of other popular network name generators (such as the "important matters" name generator of the General Social Survey), researchers

have rarely considered how respondents conceptualize closeness or how these conceptions could shape ego-networks reported in response to a closeness-based name generator.

We investigate respondents' interpretations of closeness in name generator prompts through a novel application of cognitive interviewing methods with a sample of young adults ($N=32$). These interviews elicit rich data from respondents using a think-aloud process to provide in-depth detail for how they choose 'close' alters and what contributes to closeness. Respondents then continued the think-aloud process while rating the importance of specific dimensions of closeness adapted from established social-psychological scales. We provide a significant contribution by identifying a prominent conception of closeness not included in established scales: shared past experience. Further qualitative results describe patterns in conceptions of closeness, including prevalent dimensions that relate to the generation of ego-network data, like frequency of interaction and shared past experience. Factor analytic results suggest four underlying themes describe closeness, which we term core support, long-term affection, ease and comfort, and everyday friendship. Preliminary analyses show correlations between respondent gender and patterns for determining closeness, suggesting different conceptions of closeness are not randomly distributed throughout the population.

We suggest these separate conceptions of closeness might lead groups of respondents to systematically name different types of alters in response to the same name generator. Observed differences in networks, such as the proportion of friends versus kin, or old contacts versus newer contacts, may thus stem from different conceptions of closeness rather than actual differences in social networks. This project connects to ongoing research in the field of social networks investigating the content of ties, gender differences in social networks, and improving methodologies for network name generators.

The Accuracy Problem in Network Data Revisited

Steve Corman (Center for Strategic Communication), Daniel Pressler (Arizona State University), Daniel Bliss (Arizona State University)

A series of studies by Bernard, Killworth, and colleagues in the late 1970s called into question the accuracy of communication network data gathered with sociometric questionnaires by comparing these data to communication that could be independently observed. These studies generated a significant amount of debate, but were limited in that they conducted measurements over limited periods of time. In this study, we compare perceived network data gathered with weekly sociometric questionnaires with observed communication behavior detected using digital audio recordings, gathered over a period of 8 months from 32 employees of a university-based software engineering shop. QAP correlations between the perceived and observed networks for each weak show considerable variation, $\max = 0.743$, $\min = 0.162$, $\text{mean} = 0.517$, $\text{s.d.} = 0.162$, with 15% non-significant at $p < .01$. We present exploratory analyses attempting to account for this variation.

Structures of influence: Formal and informal leadership dynamics

Kate Coronges (Northeastern University)

Understanding how groups make decisions and perform complex tasks is critical for predicting, evaluating and building successful teams. Recent research in Network Science has focused on finding unifying principles underlying network topology, dynamics and behaviors across physical, biological, spatial and social domains. Yet, social networks are driven by unique factors as they are dependent on cognitions, emotions, and beliefs, and thus require analysis and modeling rooted in social theories and behavioral processes. Teams are organized, either by design or by natural evolution, into structured relationships that are governed by rules of interactions that involve power, influence, and varying degrees of control, flexibility and adaptability. In organizations, formal imposed power structures have very different capabilities and utility than naturally occurring relationships among these same members. Work is presented that compares formal (command structure) and informal (perceptions of leadership) relationships in military units, as well as affective relationships (friendship, trust). In addition, we explore influence and spread of beliefs and behaviors dependent on those various structures and dynamics. Results show for example that informal leaders influence others' leadership attitudes and performance. This work offers empirical and conceptual insights into how the network science of teams can be better developed through network based metrics of cooperation processes and collaborative performance outcomes (e.g. adaptability and decision making) and with formalization of processes like group intelligence, shared mental models, and group think.

Crowdsourcing Network Literacy: A Grassroots Story

Catherine Cramer (New York Hall of Science), Mason Porter (University of Oxford), Hiroki Sayama (University of Binghamton), Lori Sheetz (United States Military Academy West Point), Stephen Uzzo (New York Hall of Science)

Network science has matured over the past few decades, and its potential importance for improving the understanding of complex natural and human-made phenomena is now recognized in an increasingly diverse set of domains. Its potential beneficiaries include not only researchers but also business practitioners, policymakers, educators, and virtually all people, who need to contend with (and attempt to understand) increasingly complex real-world phenomena. To advance the use of networks as a lens on ourselves and on our world, we believe that there needs to be widespread knowledge about how the study of networks – the science of connectivity – can be an important epistemological tool for all people. We assert that an understanding of networks is a kind of literacy that is important for everyone living in the 21st century.

In 2014, a small group of network science and education researchers gathered to discuss how to go about developing something that could be called “Network Literacy,” which we define as an educational resource that concisely summarizes essential concepts about networks that can be used by anyone of school age and older.

The process for developing these essential concepts was purposefully designed to be from the bottom up. No one institution, individual, or partnership “owns” or gets credit for the Network Literacy Essential Concepts. Instead, these core concepts were developed through a year-long process of iteration and international collaboration. The development process involved conducting several brainstorming sessions that focused on one key question: “What should every person living in the 21st century know about networks by the time he/she finishes secondary education?” The sessions reached various diverse stakeholders—including professional network science researchers, educators, and students.

Ideas generated in these sessions were connected to construct a concept network. We examined community structure in the concept network to distill ideas into a set of important concepts, which we then further refined through extensive discussion among a large international group, finally resulting in seven essential concepts. High school students played an essential role in the development process by providing insights and perspectives that were often unrecognized by researchers and educators. The final result, Network Literacy: Essential Concepts and Core Ideas (<http://tinyurl.com/networkliteracy>), is now available as a booklet and is available in 15 languages as of this writing. The spontaneous emergence of multiple translations – which has also been voluntary and often grassroots – illustrates the intimate involvement of the global community of network scientists in their development and dissemination.

In this presentation, we will give a brief history of this Network Literacy initiative, discuss why it was the right time and approach, and how the process was structured and gained momentum on a global scale. We will then discuss the Essential Concepts and Core Ideas and the next steps for continued success and sustainability.

The US Business Roundtable, Large Corporations and Congressional Lobbying

Bruce Cronin (University of Greenwich)

The US Business Roundtable provides an interesting extension of the legitimising claim that think tanks act above particular interests as expressions of a common or national interest. While explicitly advocating the interests of the largest US corporations, the Roundtable simultaneously embodies Charles Wilson’s popularly interpreted dictat “What’s good for General Motors is good for the country”. Where more broad-based business-based associations such as the Chambers of Commerce were unrelenting in opposing government restrictions in virtually any form, the Business Roundtable was much more selective, pragmatic and ultimately effective through the 1970s, 80s and early 90s.

Previous research on corporate engagement with think tanks and lobbying has concentrated on interlocking directorships, membership of collective groups and contributions to political action committees as indicators of corporate unity and proxies for government influence. But lobbying disclosure returns, mandated over the last decade, provide a large untapped source of data on the efforts of corporate representations to Congress in considerable detail. I employ social network analysis to identify the distinct channels of representation used by large corporations individually and complementarily to pursue a variety of issues with Congress.

I find that participation in think tanks such as the Business Roundtable is a complementary mechanism of representation to more direct political representation by individual corporations themselves rather than the usurpation of one form by the other.

Does Status Really Matter? Contextualizing Social Influence on Yelp

Ignacio Cruz (University of Southern California)

Online review and recommendation systems play an important role in informing the way people consume products or make choices about who they do business with. This study examines social influence among a subset of users on Yelp.com through centrality scores among others in a network based on their communicative exchanges through reviews. Drawing from network contagion theory, eigenvector centralities were measured in order to assess the level of influence people had within a social network—this form of centrality posits that each node (i.e. person) is assigned a score that describes their position in the network based on levels of importance, or prestigious nodes, they are connected to.

A large dataset provided from Yelp, including over 36,295 users, was used to create a social network that illuminated how both elite and non-elite status contributed to how central people were in the network. A bi-partite network was created by a subset of the data with nodes (i.e. users who with nodal attributes as elite or non-elite) that formed an edge with another node if they reviewed the same business in the network. Through a negative bi-nominal linear regression, results indicate that the amount of reviews a person gave within the network predicted their eigenvector centrality. Furthermore, elite status on Yelp was a significant predictor for eigenvector centrality when compared against a subset of non-elite members with similar structural characteristics (structural equivalence). The average star ranking of each node in the network was not significant in predicting centrality.

These findings highlight how specific node attributes contribute to social influence within the network. This study details how users on Yelp prefer quantity of reviews or the quality of them, which is counterintuitive to the mission of reviewing websites, in order to gain status, prestige, and a sense of connectedness on the site. This approach to understanding contagion theory, specifically social influence, provides information to users and organizations that manage a role in the social network while offering academics a space to uncover potential research to explain the dynamic, yet fluid social environment that influence the behaviors and actions of others. Implications for user-specific practices, network level development, and future social network research are also discussed.

Different operationalisations of the stability of the co-authorship blockmodels in time

Marjan Cugmas (Faculty of Social Sciences, University of Ljubljana), Anuška Ferligoj (Faculty of Social Sciences, University of Ljubljana), Luka Kronegger (Faculty of Social Sciences, University of Ljubljana)

Cugmas et al (2015) studied the structure of the co-authorship networks of all scientific disciplines in Slovenia. They identified the typical blockmodels' collaboration structure as multi-core–semi-periphery–periphery. Furthermore, they tested the hypotheses regarding the differences in the stability of obtained cores between the natural and technical sciences and the social sciences and humanities.

The presentation discusses the measurement of the stability of obtained cores under different operationalization of the stability of cores. Therefore, several adopted indices for comparing two partitions (on the same and on the different sets of units) are presented and compared based on empirical co-authorship networks of some selected Slovenian scientific disciplines in two time periods.

The impact of proximity and hierarchy on knowledge recombination: A field experiment

Jonathon Cummings (Duke University), Ramon Lecuona (Duke University)

We report the results of an ongoing field experiment designed to better understand the interplay between proximity (e.g., physical distance between co-workers) and hierarchy (e.g., reporting supervisor in the organization). The outcome of interest is knowledge recombination, in which employees combine what they know to produce new knowledge. Prior research has focused primarily on the benefits of proximity for knowledge recombination, due to reduced coordination costs such as spontaneous interactions that facilitate knowledge transfer as well as knowledge creation. However, the bulk of this prior research has focused on communication between peers (horizontal relationships), while

ignoring the effects of hierarchy (vertical relationships). This is important because proximity could have a different impact on knowledge recombination when supervisors are proximate to their direct reports compared with when they are far away. For example, when employees are located near their boss, the perception of being monitored may dissuade them from discussing new ideas with co-workers. A social network approach is used to study 137 employees in a global organization who recently moved corporate offices. In the old office, employees were organized by departments and were proximate to their direct boss. In the new office, employees were randomly assigned to one of three zones based on their workflow networks, rather than their department. As a result, some employees continued to sit next to their direct boss, while others were located much farther away. Exploiting variation in how proximate employees are to their direct boss in the new office, we show how workflow and communication networks change after the move to the new office. In particular, we examine how proximity and hierarchy create (and limit) opportunities for knowledge recombination in the new office.

The Development of Strategic Interventions for Dark Networks and the Role of Daily Interactions on Network Structure

Daniel Cunningham (Naval Postgraduate School), Sean Everton (Naval Postgraduate School), Robert Schroeder (Naval Postgraduate School)

Several social network researchers have paid significant attention to the structure of dark networks and the opportunities and the constraints those structures provide them. Implicit in many of these studies is that a dark network's dynamic nature will lead to different network structures, which will present it with tradeoffs between performance and resilience in the face of "exogenous" threats, such as counter-network interventions. Other social network scholars have been more explicit in their examination of exogenous effects on dark network structures by exploring alternative strategies to track and disrupt them. By viewing the authorities (e.g., law enforcement or military) and their actions as "exogenous," however, existing literature has been unable to account for almost daily interactions (i.e., operational-level interactions) between authorities and dark networks. Consequently, these studies have largely ignored the potential effects that daily interactions have on a dark network's structure.

This presentation, which is informed by systems theory, argues the development of intervention strategies to disrupt dark networks should view the authorities, along with the civilian populations with which they interact, as actors embedded in the same systems as the dark networks they attempt to understand. We hypothesize that daily interactions between authorities and dark networks are likely to have effects on tie formation in the latter and therefore their overall structure. For example, an army unit's attempt to collect information about a dark network of interest will likely cause nefarious actors to react to collection, which may ultimately result in changes in that dark network's overall structure. Based on this framework, we examine a historical, network dataset of the Teofilo Ferero Mobile Column (TFMC), which is a sub-command of the largest insurgent organization in Colombia, the FARC. We utilize stochastic actor oriented models (SAOMs) to test several hypotheses about potential effects of daily interactions on the TFMC's structure. This presentation concludes with a discussion about the practical implications that this research has for the development of intervention strategies to track and disrupt dark networks.

Exact Exploratory Blockmodeling of Multiple Relation, Mixed-Mode Networks

Matthew Dabkowski (US Army), Neng Fan (University of Arizona), Ronald Breiger (University of Arizona)

Since its earliest formulation in the mid-1970's, blockmodeling has emphasized the necessity of incorporating multiple relations (White, Boorman, & Breiger, 1976; Boorman & White, 1976). As White et al. argue in their seminal paper, "many different types of tie are needed to portray the social structure of a population" (1976, p. 739). However, despite this foundational emphasis and several notable exceptions (i.e., Baker, 1986; Borgatti & Everett, 1992; Batagelj, Ferligoj, & Doreian, 2007; Brusco, Doreian, Steinley, & Satornino, 2013; Ziberna, 2014), the vast majority of published research over the past 40 years has focused on solving blockmodels for a single relation. When multiple relations exist, a reductionist approach is often employed, where the relations are either stacked or aggregated into a single matrix, allowing the researcher to apply single relation blockmodeling techniques. Nonetheless, this simplification can mask structural nuances within the individual relations.

Moreover, while improved methods for solving single relation blockmodels have been immensely valuable and are implemented in popular network analysis software (i.e., Pajek's incorporation of direct blockmodeling (Doreian, Batagelj, & Ferligoj, 2005)), they are ultimately heuristics. Accordingly, while they provide good, locally optimal solutions,

they cannot guarantee that better fitting solutions do not exist. Again, there are several notable exceptions where researchers have developed and implemented exact methods (i.e., Brandes & Lerner, 2010; Brusco, Doreian, Mrvar, & Steinley, 2013; Brusco & Steinley, 2009); however, these methods exist for a single relation.

Accordingly, in this paper we extend Brusco and Steinley's (2009) exact procedure to the exploratory blockmodeling of multiple relation, mixed-mode networks. In particular, given (a) N_1 actors, (b) N_2 events, (c) an $(N_1 \times N_1)$ binary one-mode network depicting the ties between actors, and (d) an $(N_1 \times N_2)$ binary two-mode network representing the ties between actors and events, we use integer programming to simultaneously find the globally optimal $(P_1 \times P_1)$ actor-by-actor and $(P_1 \times P_2)$ actor-by-event image matrices, along with their associated partitions. Given the computational complexity of this problem, we also develop an algorithm to generate a minimal set of non-isomorphic image matrices of size $(P_1 \times P_1 \mid P_1 \times P_2)$ greatly reducing the total number of image matrices that must be fit when compared to the set of all possible $(P_1 \times P_1 \mid P_1 \times P_2)$ image matrices. We illustrate these concepts using a simple, hypothetical example, and we apply our technique to a network of nations.

Reinventing the Classics: Present Influences on Past Work

Valentin Danchev (University of Chicago), Jacob Foster (UCLA), James Evans (University of Chicago)

Anecdotal evidence suggests that our access to past scholarship in the social sciences and humanities is mediated by its framing in subsequent work that promotes and perpetuates it. Consider the frequency with which Adam Smith's 'invisible hand' is invoked in economics and popular culture today, a reference that is closer in a subsequent interpretative scheme in Paul A. Samuelson's Economics from the late 1940s than to original versions of Wealth of Nations (1776), when 'invisible hand' was a common descriptor for many things. Nowadays, digital libraries such as HathiTrust and JSTOR provide collections of millions of digital books and journals, which can be utilized to systematically trace the framing influences of each new mention, use or citation in social scientific discourse. We examine two distinct (but related) modes of epistemic framing: focusing (i.e., subsequent work selectively focuses or zooms in a particular concept or a web of concepts from the classic work) and re-embedding (i.e., active, or unintentional reinterpretation of the classic argument by reembedding it in a new network of present-day concepts). The project integrates natural language processing techniques (word embedding, topic modeling, and string matching) and network apparatus (semantic co-occurrence networks, community detection). We model the propagation of influential framings by employing a Bayesian information cascade model.

Intrinsic and extrinsic motivation as antecedents for employees' embeddedness in intra-organizational collaborative networks

Natalie David (University of Freiburg, Germany), Olaf Rank (University of Freiburg, Germany)

Motivation - generally differentiated into intrinsic and extrinsic - is widely acknowledged as a primary trigger for individual behavior and its influence on employees' information exchanging behavior has been emphasized. However, we lack complete understanding about how employees' motivational orientation influences their embeddedness in collaborative intraorganizational networks and thereby the structural patterns of the overall network. We assume that intrinsic and extrinsic motivation contribute differently to employees' network embeddedness by exerting differentiated effects on employees' information exchanging behavior, not only from a quantitative point of view (through their sharing and seeking activity), but also under a qualitative aspect (affecting in what type of exchange relationships they engage). To test our hypotheses, we apply exponential random graph models (ERGMs) for social selection to an aggregate of 190 employees from seven different sales teams distributed in four organizations in Central Europe. The results support our assumption that intrinsically and extrinsically motivated employees position themselves differently in the information exchange network of coworkers, providing important implications for organizational knowledge management strategies and furthering our understanding on actor agency in the formation of social networks.

Unwinding the hairball graph: pruning algorithms for weighted complex networks

Navid Dianati (Northeastern University)

Empirical networks of weighted dyadic relations often contain "noisy" edges that alter the global characteristics of the network and obfuscate the most important structures therein. Graph pruning is the process of identifying the most significant edges according to a generative null model, and extracting the subgraph consisting of those edges. Here,

we focus on integer-weighted graphs commonly arising when weights count the occurrences of an “event” relating the nodes. We introduce a simple and intuitive null model related to the configuration model of network generation, and derive two significance filters from it: the Marginal Likelihood Filter (MLF) and the Global Likelihood Filter (GLF). The former is a fast algorithm assigning a significance score to each edge based on the marginal distribution of edge weights whereas the latter is an ensemble approach which takes into account the correlations among edges. We apply these filters to the network of air traffic volume between US airports and recover a geographically faithful representation of the graph. Furthermore, compared with thresholding based on edge weight, we show that our filters extract a larger and significantly sparser giant component.

Developing Infrastructure Networks in Support of Humanitarian Assistance Missions.

Valentine Dike (Network Science Center, West Point), Daniel Evans (Network Science Center, West Point)

Strategic thinkers forecast that the US Military will face future operational challenges requiring an especially versatile, adaptable, and agile force. Rapidly evolving social, economic, and physical structures throughout the world suggest that future operations will involve complex systems, unexpected scenarios, and nonlinear processes. These environments have been described as having four components: Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). VUCA operations are increasingly forecast to be conducted in urban environments. Migration to cities in much of the developing world is creating areas commonly referred to MegaCities. Recent history, such as the unrest in Mali, has demonstrated that as crises arise, people tend to flee to urban areas stressing an already strained infrastructure. This is the type of humanitarian assistance operating environment that the United States foresees in the near future.

Our team at the Network Science Center, West Point is developing a model of infrastructure networks that will enable military leaders to successfully plan and execute these types of operations. With the assistance of our partners on the ground, we are mapping the geographical location of essential resources in designated neighborhoods. Based on this information, we will explore the natural clustering of neighborhoods in a large urban environment while building upon the foundation of traditional network analysis techniques.

When complete, we will produce a map of the neighborhood clusters, identifying the mathematical characteristics, in this case resources and their location, that causes this clustering. We will also produce an analysis that identifies the “resource gaps” taking into account geography and transportation routes. This analysis will provide decision makers with a powerful perspective on key communications occurring in networks, different collaboration mechanisms, and organizational policies. More importantly, the analysis will illustrate the complexity of human systems through geographical mapping and analysis of relationships between distinct neighborhoods, key resources, the local population, and organizations.

This presentation will introduce our proposed research scenario of Kigali, Rwanda, and describe our initial data collection efforts. Additionally, we will introduce our quantitative methodology and present our initial results and findings.

Integrating ethnographic perspectives and personal network data in the study of vicarious racism and hypertension among African Americans

Dalila D’Ingeo (University of Florida), Clarence Gravlee (University of Florida), Raffaele Vacca (University of Florida)

Racism and discrimination in the USA have been linked to premature deaths and health inequalities among African Americans. Compared to whites, black people suffer disproportionately from heart disease, hypertension, and chronic high blood pressure. Although most biomedical research studies these conditions as fundamentally determined by genetic makeup, there is evidence that social and cultural factors, including multiple dimensions of systemic racism, contribute to health inequalities among racially defined groups. The aim of this study is to investigate how everyday racism directly and indirectly impacts African American individuals embedded in social networks, and how network structure and composition are related to different experiences of racism. Our main goal is to study the connection between racial discrimination and hypertension and other poor health outcomes among African Americans. We use the notion of vicarious racism, which refers to experiences of racism suffered indirectly through family, friends, and other personal contacts. We explore different operationalizations of this notion using quantitative and qualitative

data from a community-based survey conducted in Tallahassee, Florida. We combine personal network data and semi-structured ethnographic interviews with 34 respondents between 25 and 65 years old, who self-identified as African Americans. We elicited personal networks by asking respondents to name 30 people they knew by sight and by name. We then asked respondents to report on several attributes of each alter—including race, skin color, and whether each alter had talked to ego about a specific experience of racism. We also asked respondents to assess all pairwise ties among their alters in order to obtain personal network structure. We extract a structural typology of personal networks in our data and analyze compositional variables such as the distribution of ethnicity in the network and the proportion of co-ethnic alters who report discrimination. We also examine the structural cohesion between alters identified by a specific attribute, such as co-ethnic alters or alters who report discrimination. These structural and compositional measures are conceptualized as independent variables to describe the respondent's social environment and experience of vicarious racism. We then combine the personal network analysis with qualitative data from the 34 semi-structured interviews to investigate in-depth how personal network structure and composition are associated to individual experiences of racism and their impacts on health, particularly hypertension. This presentation describes the methodological design of the study, discusses the construction of network-based measures of vicarious racism, and shows preliminary results on the association between personal network characteristics and hypertension in our sample.

Exploring the meaning of interdisciplinary collaboration in a scientific organization: An application of text and network analysis

Ly Dinh (University of Illinois Urbana-Champaign), William Barley (University of Illinois, Urbana-Champaign)

A wide array of organizational research suggests that teams with diverse knowledge and expertise are more likely to produce innovation than those without interdisciplinary bridges. Thus, a growing array of studies has sought to understand the mechanisms by which organizations can foster successful interdisciplinary relationships. In a prior case study of a scientific organization, we found that although members of this organization had shared goals to foster cross-disciplinary relationships, they were experiencing difficulties doing so. In this study, we propose that one reason this conundrum existed in this organization was due to differing conceptualizations of the notion of "collaboration." The goal of this study is to extract the concepts associated with interdisciplinary collaboration by members of a scientific research community to explore whether such diversity existed.

We explore the meaning(s) of interdisciplinary collaboration by performing a textual network analysis on a series of 25 interviews we conducted with members of the scientific organization. Interviews are a valuable data source as they provide personal and specific insights to how each member perceived the concept of collaboration. Our goal is to discover the broad narratives present surrounding the concept of interdisciplinary collaboration and to use this understanding to inform the design of interventions that may help foster cross-disciplinary relationships. Thus, we propose the following research questions: What concepts are most associated with interdisciplinary collaboration? Do individuals exhibit different structural semantic characteristics surrounding the concept of collaboration? If so, what structural and individual factors are associated with differing narratives?

Textual data were obtained from semi-structured interviews with members of a large interdisciplinary scientific organization. Respondents shared their work background and experiences with interdisciplinary collaboration at the organization. Interviews were audio-recorded and transcribed into text format. Data were aggregated into a corpus and analyzed using the *tm* and *igraph* packages in R. We removed punctuation, utterances and stop-words as they are not relevant for the research question. The data matrix contains 8,581 terms and network visualization reveals the most frequently occurring associated with interdisciplinary collaboration are "funding" (257 times), "money" (166 times), "support" (140 times), "communication" (118 times), and "change" (116 times). These preliminary results suggest that participants perceived more resources in terms of funding and communication were needed to foster collaborative relationships. These terms contribute to a broader narrative from previous qualitative analyses suggesting that the organization needs to dedicate more effort to implementing interventions to facilitate more interdisciplinarity. Future analyses will explore whether this narrative of resource association was uniform across participants. We will use egocentric network analysis to see if different discourses on collaboration emerge across members of the organization and, if so, what individual and structural characteristics are associated with the deployment of these different discourses.

Think before you network: Cognitive flexibility, agency, and information search

Bálint Diószegi (SKEMA Business School), Daniella Laureiro-Martínez (ETH Zurich), Stefano Brusoni (ETH Zurich)

Individuals differ in the extent to which they are in control of their networking. While certain individuals' networking is driven by planning and forethought, others' is more passive and left to serendipitous processes. Such differences may have important consequences when it comes to information search in organizations. In this paper, we argue that if an individual has a minimal level of awareness of what he/she is searching for, and where it might reside, then forethought-driven (i.e. agentic) networking should be more effective. To examine our hypotheses, we conducted a networking experiment, in which participants interacted with each other, relying on each others' networks in order to locate their target information. Our results show that individuals who followed through on their prior planning (as opposed to leaving networking to chance) found more relevant information, and were more likely to locate their target. In addition, we find that such individuals are characterized by higher levels of cognitive flexibility, a trait linked to creativity and adaptability. When searching for information, these characteristics may allow individuals to think of their networks in terms of resources, instead of as social and emotional relationships. Furthermore, they might realize more readily when a passive networking strategy is not producing the desired results, and switch to a more agentic one. By exploring the link between micro-level cognitive characteristics and networking behavior, this work may inspire future research on the role of individual agency in social networks.

(Dis)Embedded Aggression in Multiplex Networks: Effects of Perceptual Overlap and Robustness of Positions on Bullying among Adolescents

Malte Doehne (LMU Munich, MCMP), Michael von Grundherr (LMU Munich, Center for Neurophilosophy), Anja Geisler (LMU Munich, Department of Psychology)

Bullying in schools is a social phenomenon. The presence of onlookers and how they react to the observed behaviors of their peers establishes a relational context in which bullying either does or does not proliferate. Social network analysis can capture some of this relational complexity and can thereby help frame bullying and aggression more generally as highly context-sensitive behaviors. In this paper, we examine how adolescents' differential embeddedness into multiplex networks of reported social relations among their classmates (of friendships, animosities, high and low popularity, among others) affects their propensity to be embroiled into relations of physical aggression with their peers. Specifically, we hypothesize that aggressive relations will flourish when adolescents do not share common understandings of the social structures they are a part of. Furthermore, we hypothesize that adolescents who occupy robust positions in multiplex networks, i.e. positions that are unaffected by marginal changes in any single type of relation, will be less likely to initiate aggressive behaviors than adolescents whose position in the social structure of the classroom environment is precarious and disputed. Our study is based on rich data that has been collected on more than 800 children in 45 classrooms of grades 7-9 in three schools of Southern Germany. By relating reported aggressive relations to reported actor configurations in multiplex networks, we contribute to a growing literature that examines socio-structural antecedents to adolescent aggression in schools using network-analytical techniques.

The Ecology of Scientific Production: Modeling Competitive Dynamics among Sociology Journals

Fedor Dokshin (Cornell University), Matthew Brashears (University of South Carolina)

Scientific disciplines can be defined by their social and ideational structures. Researchers are embedded in social networks formed through collaboration, institutional affiliations, conference attendance, and other forms of interaction. Researchers are also embedded in an ideational structure, which is constituted by the clustering of ideas, concepts, research paradigms, and subject areas. Taking advantage of data on scientific collaborations, recent research has advanced our understanding of how social structure influences the scientific questions that get asked and the answers that are proposed. By comparison, research on ideational dynamics has been slow, in part due to the difficulty of developing adequate empirical measures of ideational structures. This article makes both a theoretical and a methodological contribution in this direction. Theoretically, we propose and test an ecological theory of scientific production, wherein scientific journals compete with one another for publication of high impact research. Journals occupy niches within the ideational space and draw resources (i.e., publications) from researchers who work within the niches. Methodologically, we develop a method for modeling the ideational structure of a scientific discipline as a two-mode network. Individual researchers, who form the nodes in the first mode, are linked to areas of expertise

in the second mode. To define researchers' areas of expertise, we apply natural language processing—specifically, probabilistic topic modeling—to textual data of authors' publications. We verify this method by comparing our results with author-submitted keywords. Finally, we apply this framework in the context of recent scholarship in sociology. Using data from Web of Science and SocINDEX on 50,000 English-language sociology articles published between 1985 and 2015, we test predictions about how competition among journals influences publishing trajectories of individual researchers and the direction of the discipline as a whole.

Hopes and Fears: Institutional logics and discourse sentiment around MOOCs

Evgenia Dolgova (Leeds University Business School), Pursey Heugens (Rotterdam School of Management, Erasmus University), Miriam Wolf (Hertie School of Governance), Krsto Pandza (Leeds University Business School)

While massive open online courses (MOOCs) promised to make best education available to the masses, the hype and disillusionment around this new practice delude its promise. Anchoring our analysis in institutional logics perspective, we examine MOOC-related discourse and sentiment to understand the dynamics of field-level institutional logics around this new practice emergence. We rely on a range of socio-semantic network analysis methods to shed light on underlying institutional logics and the role of the implicit attitudes: we first perform bibliographic content mapping to determine central themes in discourse of incumbents, challengers and general public and their anchoring in broader institutional logics, and then combine topic modeling with sentiment analysis to shed light on the role of the implicit attitudes. We find that challengers unite the contradictions in the current institutional logics and infuse the discourse with positive sentiment, while incumbents mostly rely on the neutral 'professional' discourse around new practice.

The Open Dynamic Interaction Network (ODIN) framework for collection and modeling of continuous time social and behavioral data

Kirk Dombrowski (University of Nebraska-Lincoln), Bilal Khan (University of Nebraska-Lincoln)

This research reports on ongoing efforts to advance a wide range of social and behavioral health fields beyond the current limitations of research methods that rely on person-to-person surveys to construct static “snapshots” of social networks. The Open Dynamic Interaction Network (ODIN) framework makes available the means needed to record and analyze dynamic social interaction over long timescales and to observe interaction patterns and structures in their actual state of continuous flux. We report and demonstrate the operation of a cost-effective mobile/wearable cross-platform continuous time interaction (CTI) data acquisition system operating on cellphones and smartwatches, administered using a web-based administration service. The platform allows social and behavioral health researchers to administer their study's behavioral and social tracking protocols and manage the collected CTI data remotely, across significantly larger social research scales.

The ODIN platform combines ultra-fine-grained social network tracking with cutting-edge instantaneous time sampling to allow for “thicker” description of captured interactions. Researchers use a survey “grammar” that references both spatial and social contexts to create automated, large-scale context-driven data collection surveys. These surveys aim to produce real-time-relevant questions that focus on the participants' state within contextualized interact, as well as applications of this new platform and paradigm and future research directions. The result is a network mapping platform that passively tracks social interaction and spatial context, using these to drive systematic, ongoing, context-specific “reflexive” survey responses from study participants.

In this talk, we describe the ODIN platform, its design and operation, the dynamic interaction network data it makes available, recent applications of this new platform and paradigm, and future research directions.

Heterogeneous Personal Networks: Connecting across race and class in personal relationships.

Silvia Dominguez (Northeastern University), Juanita Barrera (Northeastern University)

Scholars have demonstrated that most individuals know only people like themselves and few have personal relationships which cut across race, ethnicity, class and or gender. Race and ethnic relations have usually involved communities that are homogenous with ethnics or racial minorities only knowing people like themselves due to ethnic enclaves, homophily and/ or segregation. In fact, very few people have access and/or opportunity to develop cross-racial, or

ethnic relationships. We conduct an ethnography of the virtual world of Facebook and look at how individuals have relationships that cut across race or ethnicity. We answer the following questions: What qualifies as a personal relationship that cuts across difference? How common is this? Are some ethnic or racial groups more likely to have different people in their networks? What makes people develop heterogeneous networks across race and ethnicity? What do people gain from these heterogeneous networks? What are some of the barriers and conflict involved in heterogeneous personal networks?

Patterns of votes on the Rehnquist Supreme Court

Patrick Doreian (University of Pittsburgh), Jeffrey Johnson (University of Florida), Stephen Borgatti (University of Kentucky)

We examine the distribution of the voting patterns for the US Supreme court during the 11-term period (1994-2004) under William Rehnquist when the composition of the court was stable. The Justices on the Court were Breyer, Ginsberg, Kennedy, O'Connor, Rehnquist, Scalia, Souter, Stevens and Thomas. Their votes on all non-unanimous decisions were treated as a signed two-mode network. Supporting a decision was treated as a positive tie with the other majority members and dissenting from the decision was treated as a negative tie. Recusals were treated as null ties. Changing patterns in the voting of these justices were examined both temporally and in the context of substantive and constitutional issues that the decisions involved. Multiple methods were used to track these changes. Also examined was the influence of justices over other justices regarding concurrence and dissent.

Playing with Signed Preschool Play Preference Graphs

Patrick Doreian (University of Pittsburgh), Jeffrey Johnson (University of Florida)

We explore a set of over-time play preference networks among 3 and 4 year old preschoolers that was originally used to study peer rejection that could have negative impacts on a wide range of behavioral and psychological outcomes over the course of a child's life (e.g., academic performance, classroom behavioral problems). In the original series of papers the various analyses never took analytical advantage of the signed nature of the network data. Children were asked to rate their play preferences with each of the other children in the class using a happy face, neutral face and sad face ratings scale. Here we extend the analysis using a number of analytical approaches that take advantage of the signed data. In a first attempt at an analysis structural balance was used. However, the data had high numbers of negative ties that appears to limit the utility of structural balance for signed networks under these conditions. This was followed by the use of a more relaxed structural balance approach. Although more satisfying, there is still some need for improvement. We end with a discussion of some conceptual issues surrounding the analysis of signed graphs with a large number of negative ties.

The Influence of Social Networks on Maternal Health Behaviors of Women of Reproductive Age in Ghana, West Africa

Leanne Dougherty (John Snow Inc), Thomas Valente (University of Southern California), Emily Stammer (John Snow Inc)

We collected data using a household survey to measure knowledge, attitudes and behaviors related to breastfeeding, antenatal and postpartum care. Approximately 1,500 women were interviewed from nine communities in three districts in the Upper West Region of Ghana. Using an egocentric approach, we asked respondents to name up to three contacts that the respondent had discussed maternal health and breastfeeding issues with before or after their most recent pregnancy. Regression analyses showed that naming more conversation partners was positively associated with six pregnancy and delivery outcomes. In contrast, women who reported having conversations about prenatal care were less likely to give birth at facility, have a skilled birth attendant, or have obtained postnatal care within 48 hours of giving birth. We also show a time trend to the number of conversation partners reported such that interviewers recorded fewer network partners over time suggesting they learned that they could shorten the interview schedule by discouraging the naming of many partners.

Diffusion of Innovation in Family Size Preferences and Acceptability of Contraceptive Use between Urban Migrants and Non-Migrants in Rural Senegal

Laetitia Douillot (The George Washington University), John Sandberg (The George Washington University), Valerie Delaunay (IRD/LPED), Yacine Boujija (The George Washington University)

Fertility and fertility preferences of rural-urban migrants in less developed countries are often lower than for non-migrants in the origin population. This has been at least partially attributed to adaptation of migrants' preferences and behaviors to those prevalent in urban areas. From this it has been hypothesized that the fertility and fertility preferences of members of origin populations may be influenced by lower fertility and fertility preferences of returned migrants through social diffusion mechanisms. Prior attempts to identify such mechanisms have relied largely on estimates of the associations between aggregate rates of return migration or simple measures of social association (such as having migrants in the immediate family) and non-migrants' fertility.

In this paper we use a new, unique and extensive social network survey data from a high-fertility, rural Senegalese population linked to an ongoing demographic surveillance system to directly test for potential diffusion of fertility preferences from returned and contemporary urban migrants to non-migrants. The Niakhar Social Networks and Health Project (NSNHP) includes a large representative sample of the entire rural population under continuous demographic surveillance as well as complete enumeration for the entire population of one village within the surveillance catchment area. The network component of the survey elicited an unconstrained number of social network alters over 16 name generators (including ties to those not currently resident in the population) as well as extensive information on tie strength and affective proximity of alters. On average, the survey identified 27 unique alters per respondent. Place of residence for each alter cited was established, and linked to complete migration histories over the prior 30 years in the surveillance system.

We first model the fertility preferences (operationalized as ideal family size and acceptability of contraceptive use) of those without urban migration experience in the general population as a function of the number of alters with prior or current urban migration experience, and the affective proximity of migrants with urban migration experience relative to those without, to ego. In all models we control for network endogeneity with measures of respondents' own characteristics including age, prior migration experience, education, prior fertility experience and household wealth. To identify independent network effects net of the broader social contextual, we further specify models including measures of the aggregate proportions of individuals within both egos' villages and residential compounds with urban migration experience.

We then estimate the same models for the population of the village in which all residents were surveyed, additionally modelling respondents' fertility preferences as a function of the preferences of those with and without urban migration experience within their social networks, as well as the measures of the structural position of migrants within respondents' social networks as a whole, including network centrality and prestige.

In conclusion, we discuss the relevance of our results concerning the potential impact of diffusion of fertility preferences from returned migrants to non-migrants for fertility trends in the area, in other high fertility populations, as well as the broader implications of our results for network models of diffusion.

Refineries of Denial: A Fossil Fuel Power Structure at Koch Industries' Political Strategy Meetings

Michael C Dreiling (University of Oregon), Jeff Gunn (Whittier College)

In this paper, Refineries of Denial, the ultra-conservative policy planning networks associated Koch Industries, the right-wing advocacy of David and Charles Koch and their semi-annual meetings are examined using original network data sets. Robust and cohesive inter-organizational networks forge ties between these fossil-fuel billionaires, climate change denial think tanks, the media, and the old money foundations that broaden the influence of deniers. These are well-established observations in Brulle (2013), Dunlap & McCright (2011), and Farrell (2015a, 2015b). The research presented here offers an additional snapshot of this conservative corporate ideological network. Data for this network begins with the membership roster of attendees at the 2010 private meetings sponsored by David and Charles Koch of Koch Industries. A substantial proportion of the attendees represented fossil fuel interests, mining interests, major conservative billionaires and their foundations, and conservative media figures. From this membership roster, organizational affiliations were identified among attendees. For this particular paper, the networks connecting attendees at the private political sessions are examined. Specific affiliations between the big conservative foundations (and their representatives attending the meetings), and organizations responsible for promoting climate change denial

are examined. This empirical snapshot demonstrates a fossil fuel funding and ideological network devoted to climate change denial at these political strategy meetings.

N-Body: Search, Sort, and Filter Twitter Data via a Planar Visualization to Handle Real-Time Data

Patrick Dudas (Penn State University)

When dealing with Twitter data, especially in real-time, there are many approaches to handle data that represents network, temporal, textual, and geographical information. With these, most fall short when trying to graphically support all four levels. N-Body treats tweets as independent documents. It visually allows a user to sort, group, and filter tweets in latent community structures based on words and/or emojis used, the latitude or longitude of the message, or temporal ranges. Tweets are then separated using convex hulls with central nodes indicating their filter term, location, or temporal range. As tweets converge on these central nodes, the visualization algorithm utilizes an overlapping latent community structure, creating a visualization that is akin to a Venn diagram, highlighting tweets that meet one or multiple levels of filters. Once filtered, users can then view these sub-networks via graph constructs such as: user -> user, user -> hashtag, hashtag -> hashtag, user -> URL, and taxonomies based on tweet content. Additional social network analysis methodology are also added at this point to showcase centrality measures and group membership. Also, to further analyze these graph structures, users will have the ability to export networks into .gexf format (typically utilized in Gephi). Our hope with this type of research is that with very large document spaces (like social media), we can better understand events as they occur without needing to know exact details (like trending hashtags or localized rhetoric) to start searching and collecting relevant information.

The coevolution of adolescent friendship networks, loneliness, and cigarette smoking

Stephanie R. Dyal (University of Southern California), Thomas W. Valente (University of Southern California)

The proposed study uses RSiena to assess the coevolution of adolescent networks, loneliness, and smoking. Social networks and loneliness are both associated with smoking, but have not been examined concurrently as predictors of smoking, despite their potential overlap. Research suggests a person's own smoking behavior is associated with the smoking behaviors of their friends through both peer influence to smoke and selection of peers homophilous on smoking status. Few studies have explored the association between social networks and loneliness, but the literature suggests that people with few friends or who are connected to lonely people are more likely to be lonely. This study examines these associations with two models, one examining the coevolution the social network and loneliness and one examining the coevolution of the social network and smoking. Additionally included in these models are effects for linguistic acculturation, parental communication, depression, and demographics.

Data from two time periods were collected from 755 adolescents attending one of 4 schools in Southern California, USA. Data will be analyzed using a stochastic actor oriented model (SAOM) for network dynamics in the RSiena package in R. Participants were 53% female, 75% Hispanic/Latino, and had a median age of 18 at the conclusion of the study. Models will be run separately by school and results will be combined with a meta-analysis.

The first goal of this study is to assess the stability of loneliness and how it is associated with network structure and psychosocial variables in a coevolution model of the friendship network and loneliness. We predict that ego-effects for acculturation to the US culture and parental communication will be negatively associated with loneliness. We have no a priori hypotheses concerning how network structural characteristics will be associated with loneliness, nor how loneliness and the other psychosocial variables predict the network structure.

The second goal is to assess the dynamics of social networks and smoking in a coevolution model including effects for other psychosocial variables. The ego-effect for parental communication will be protective against smoking. Network measures will differ in their association with smoking; measures which assess reciprocity and transitive triplets and which suggest stable friendships will be protective against smoking and measures such as the smoker status of alters would be predictive of smoking. We do not have a priori hypotheses for the predictors of network structure.

The relation of unemployment, health and the role of social networks

Andreas Eberl (Institute for Employment Research (IAB)), Gerhard Krug (Institute for Employment Research (IAB)), Katharina Seebaß (Friedrich Alexander University Erlangen-Nürnberg)

The quality and quantity of individual's social contacts is related to the individual health status. This is especially interesting when looking at health of unemployed people. On the one hand unemployment leads to poor health over time. On the other hand it has been shown that social networks have a positive influence on the health of one's person. It is assumed that with a bigger social network the negative effect of unemployment on health can be buffered to some extent. We use the "Labour Market and Social Security" (PASS) panel data of the Institute for Employment Research (IAB) in order to examine the role of social contacts of unemployed on their subjective health status. We estimate dynamic panel models to get a causal effect. The advantage of a dynamic panel approach in health and network is that we are able to control for health and network of the past. Another main advantage over a conventional fixed effects estimator is that endogenous variables can be instrumented by themselves. First results show the well-known positive effect between social networks and self-rated health. Against our expectations, social networks cannot buffer the negative effect of unemployment on health.

Comparing accuracy and respondent burden of approaches to gathering alter-alter tie data in egocentric networks.

Kate Eddens (University of Kentucky College of Public Health), Jesse Fagan (University of Kentucky Gatton College of Business and Economics)

There are multiple approaches for eliciting the existence of alter-alter ties in egocentric networks. In an ego network, there are $(n*(n-1))/2$ possible undirected ties between alters. For example, if the ego has 20 alters in his or her network, he or she has to match 190 pairs of alters in order to represent the presence of all possible alter-alter ties. This is a burdensome process, no matter the approach. Both text- and visual-based approaches to gathering alter-alter tie data exist in traditional pen and paper and computer-based surveys. Common text-based approaches to gathering alter-alter tie data include matrices and checklists of pairs of alters (e.g., asking: "Does Bob know Kevin? Does Bob know Sally? Does Bob know Mary?"). Visually-aided approaches include using Post-Its or boxes to represent alters and drawing lines between them, using cards to group alters together who know one another (pile sort), and creating a computer-based network diagram of alters and having the respondent physically draw the tie connecting alters. We have created two computer-based, visual approaches to gathering alter-alter tie data, with the goal of easing the burden of alter-alter tie data collection. However, we do not know whether our new approaches are more or less accurate than existing approaches, and if they reduce the perceived burden of data collection. This study will test seven approaches to eliciting alter-alter ties: 1) matrix (computer-based), 2) checklist of pairs (computer-based), 3) network diagram (paper-based), 4) network diagram (computer-based), 5) pile sort (computer-based), and the two new computer-based approaches – 6) a "Netflix rating approach," and 7) a grouping approach based on prior characterization of alters. Undergraduate students will watch an episode of a television show with a central character (ego) and a network of other characters (alters). After being prompted to pay attention to the interaction between characters, participants will watch the episode twice. They will then be randomized to one of the seven alter-alter tie generating conditions, given a network of the characters in the television show, and asked to connect the alters who spoke to one another during the episode. We will compare the effectiveness of each of the alter-alter tie generation approaches in creating an accurate representation of alter-alter ties in the network. In addition, participants will rate the perceived burden of recording alter-alter ties as well as their satisfaction with the approach. Results will be presented, and approaches with the highest combination of accuracy and favorability will be incorporated into OpenEddi data collection software.

An investigation into seasonal influenza vaccination uptake in foundation doctors, using social network analysis and spatial modelling.

Rhiannon Edge (Lancaster University), Thomas Keegan (Lancaster University), Peter Diggle (Lancaster University), Rachel Isba (Pennine acute hospitals NHS Trust)

Introduction The Chief Medical Officer for England recommends that healthcare workers have a seasonal influenza vaccination in an attempt to protect both patients and NHS staff. Despite this, only 55% of healthcare workers are vaccinated. Social network analysis is a well-established research approach that looks at individuals in the context of their social connections. We applied techniques from social network analysis and spatial modelling to analyse the foundation doctors' (those in the immediate postgraduate training phase) decisions to vaccinate, given their social network and the individual demographic factors.

Methods Data were collected from a population of foundation doctors working within the Pennine Acute Hospitals NHS Trust, they self-reported their seasonal influenza vaccination status along with basic demographic information (sex, year of training, site location within the Trust, etc.) and social relationships within the population. We used a social network analysis approach to look at vaccination distribution within the network. We assessed the network density and the assortativity of influenza vaccination status within the population. We then applied an auto-logistic model to assess the likelihood of an individual vaccinating given their peers' behaviour.

Results Of the 200 eligible foundation doctors, 140 (70%) provided complete data, and over 70% of responders had received a seasonal influenza vaccination. There was no clustering of vaccinated individuals within the foundation doctor social network. The second year foundation doctors studying on the east arm of the Trust were found to have a far denser social network than their peers in the west arm. A denser network is at a greater risk of rapid infectious spread. The auto-logistic model demonstrated that an individual's influenza vaccination decision was affected by the choices of their neighbours.

Discussion This foundation doctor population exhibited vaccination coverage levels higher than those seen in other healthcare groups, this is an encouraging finding as the study population was made up of early career doctors. Although, there could be some bias in this result due to limitations in data collection. Also, a lack of vaccination clustering was observed within this population, which may provide natural protection from influenza outbreaks because of the effects from herd immunity.

The auto-logistic regression model suggested that there were some network effects on an individual's vaccination decision. This effect remained even when variables (year and sex) were introduced. It is important that policy makers consider models such as these otherwise the effects of the social network may be underestimated when investigating possible interventions aimed at improving vaccine uptake (for example, educational campaigns). We suggest that it is unlikely that vaccination coverage will reach 100% without a major intervention - however, our results suggest that social interactions may compound any positive effects from interventions.

Using Qualitative Comparative Analysis (QCA) to address debates in the literature about centralisation and density of covert networks.

Gemma Edwards (University of Manchester), Susan O'Shea (University of Manchester), Nick Crossley (University of Manchester), Martin Everett (University of Manchester), Johan Koskinen (University of Manchester)

This paper presents some of the initial findings from a Mitchell Centre Leverhulme funded project on covert networks. We have gathered a range of datasets that can be variously defined as being entirely 'covert' or that operate in ways that assume degrees of secrecy are essential elements in order for those groups to function or to achieve particular aims or objectives. These networks span a range of illegal and legal networks and cover themes such as co-offending in criminal networks, gangs, drug users, political and social movement activities, terrorist attacks including suicide bombings, and deviant sexual behaviour. Many of the datasets are freely available, others have been kindly donated by colleagues and some have been reconstructed from a number of sources by the project team. For the purposes of this paper we are working with a subset of approximately forty datasets covering the broadest possible number of themes and ranging in network size from approximately ten to tens of thousands of nodes.

Our previous work identified a number of contradictory theoretical claims from a growing literature on covert networks. Many of these claims were insufficiently tested on empirical data with some of the most frequently discussed topics being on issues of centralisation and density. We propose using Qualitative Comparative Analysis (QCA) methods to address these particular debates in the literature and to test claims with empirical evidence from our datasets. As a methodology that bridges the qualitative quantitative divide, QCA allows us to draw on our case-based knowledge of covert networks to develop models of causation and to test hypotheses as discussed in the literature. Our mixed methods approach makes particular use of fuzzy set QCA which allows for variation in membership across sets which is particularly useful for examining the structural properties of covert networks. To conduct our analysis we make use of the fsQCA function in the QCA package in R. This package, as developed by Adrian Dusa and Alrik Thiem, implements the method of QCA as developed by Charles Ragin using the Quine-McCluskey optimisation. We will discuss our choice of QCA in R over the fs/QCA application developed by Ragin, we will share some of our initial findings from the QCA application and discuss how its use might contribute to the development of a typology of network 'covertness'.

Stability and change in corporate governance networks

Christoph Ellersgaard (Copenhagen Business School), Lasse Folke Henriksen (Copenhagen Business School), Anton Grau Larsen (Copenhagen Business School)

This paper consists of two parts. In the first part of the paper we survey the literature on corporate governance networks and tease out a series of propositions about how such networks tend to evolve. We map out the prevalent mechanisms of change, endogenous as well as exogenous, and list different approaches to modeling this change. In the second part of the paper we analyze the evolution of the Danish corporate governance network from 1990-2015 based on an original dataset of board affiliations for the entire population of corporations. We focus on extending a new method for identifying core/periphery structures within corporate governance networks (Ellersgaard and Larsen 2015) to temporally extended network data and discuss our method in view of competing approaches.

An Exploration of Textual Stancetaking by Major Bioethical Authors, 1971-1979

David L Elliott (University of Missouri)

As part of a larger project seeking to unite cognitive-functional linguistics with social network analysis in the study of the interactions and patterns in written academic discourse, this study analyzes the discursive stances taken in a sample of works by major authors in an initial phase of professional bioethics. This initial period of bioethics is delimited by major endpoints, the founding of the Hastings Center in 1969 and the publication of the Belmont Report and of Beauchamp and Childress' textbook *Principles of Biomedical Ethics* (1979). A citation network analysis, in conjunction with a literature review of histories of bioethics, is performed to identify the most influential bioethical authors during this period. A sample of writings by key authors is selected for an exploratory analysis of stancetaking in academic texts. An approach is developed that draws from cognitive-functional linguist Du Bois' (2007) concept of the stance triangle and from Martin and White's (2005) appraisal model of evaluation (also see Hood 2010). Evidential and knowledge claims are included within the conception of stance used here (e.g, Hanks 2014). The approach also draws from cognitive-functional approaches to textual coherence and structure, such as Mann and Thompson (1988), Sanders and Spooren (2007), and Giora (2014). Further research will seek to extend cognitive-functional linguistic assumptions to the analysis of the stance structure within and between academic articles through stance networks.

When politics make markets, regulation in France in the 1980's

Fabien Eloire (Lille1 University)

This communication presents the exploratory results of a research program concerning both the administration and the policy of economics within the French State during the Eighties. We consider the *Bottin Administratif* (a book which, each year, lists State's whole staff) as an interesting source in order to retrace the institutional and hierarchical environment of actors, by focusing more particularly on social networks. Our goal is both methodological and theoretical. Regarding the methodological aspect, we plan to use the organization charts of the economic French administrations (such as: 'Direction du Tresor', 'du Budget', 'de la Prevision'), and of French State's "cabinets" (such as: 'ministere de l'Economie', 'Premier Ministre', 'President de la Republique'), and to transform them in relational networks. These networks will be, thus, interpreted as a proxy of the structure of this 'milieu' and as an indicator of the bureaucratic and political forms of capital of these actors. On the theoretical aspect, we aim at highlighting that, beyond the humdrum and bureaucratic running of French State and its administrations, we face a field which has the capacity to auto-reform itself. Thus, we postulate that this 'milieu' is able to renew economic institutions and the french forms of market regulation, and to move the frontier between Capital and Travail. This research wants to contribute to the understanding of the transformation of the social and economic relations within the French society by focusing, especially, on the period of the financial markets reform in 1984-1986.

IDENTITY CHANGE AND REVERSION FROM ISLAM: An Egocentric Social Network Perspective

Sakin Erin (University of California-Riverside)

When the self goes under identity change usually by forming a new identity, it impacts its egocentric social network and thereby the social structure in which it is embedded such that it may seeks homophilous social ties, which are

more likely to verify its identity, while it may shed those ties, which are less likely to verify its identity. Identity change, simultaneously, sets in motion network processes over which the self has a limited control. Ego's alters (friends and/or relatives) may sever their ties to her because of change in her identity. More importantly, the reactions of alters to identity change determine the composition and the structure of the networks in which individuals are embedded. As such, I argue that when individuals adopt new identities, such as converting to a new religion, they not only shape the social structure in which they are embedded but also develop failed or successful identities (i.e., verified or not-verified identities) depending on the amount of structural and compositional changes in their egocentric social networks.

Gezi Park Protests Online: Networks for Collective Learning

Gunes Ertan (Koc University)

June 2013 uprising in Turkey was unprecedented in many regards. According to some empirical studies, more than half of protestors had never participated in any form of collective action event before June protests that started to protect one of the last green spaces in Istanbul, Gezi Park, from becoming a shopping mall. In the absence of activism history, various Internet based networks such as WhatsApp, Facebook chat groups, and Twitter acted as critical tools for sharing logistical information, and developing strategies for coping with police violence.

Using firehose Twitter data on the June 2013 uprising in Turkey, this study aims at deciphering the role of social networks in facilitating collective learning under conditions of uncertainty and risk during spontaneous collective action events. Findings of the study are likely to contribute on growing literature that aims at integrating role of social media and social networks into resource mobilization and framing approaches to social movements.

An international perspective on social isolation and community in personal networks

Vicente Espinoza (USACH-COES), Matías Bargsted (Pontifical Catholic University. COES), Luis Maldonado (Pontifical Catholic University. COES)

The analysis of social inclusion on the basis of the characteristics of ego-centered networks has a well established intellectual status in North America. Indeed, knowing who people talk to helps identify locations of social structure where trust resides and develops, as well as the characteristics of individual's social experience. Social network analysis has been at the kernel of this debate, from the typology of lost, saved and liberated community (Wellman 1979) to more recent debates on social isolation (McPherson et al 2006, Fischer 2009). Few comparable studies of ego-centered social networks have been developed beyond the US and Canada. In spite of obvious difference of size, economic development, political culture and religious beliefs, comparison with other countries has value for the generalization of social networks findings.

In my presentation I compare survey results about personal networks in Chile 2014 (N=2025), the US (1985 and 2004), and Toronto (1968, 1979 and 2004). I will compare results from the three contexts on the size and composition of discussion networks, the diversity of interpersonal environment in terms of its demography, politics, religion and residence. Next I will discuss the structuring effects operating on the size of ego-centered networks, considering demographic and behavioral factors, as well as an estimation of the size of the extended network based on a positional generator (Lin 2001, DiPrete et al 2011). I test three competing arguments regarding the characteristics of social structure in Chile: First, the destruction of social solidarity as a result of capitalist modernization which should yield social isolation (UNDP 2012). Second, involution of solidarity to restricted groups such as families and churches, yielding an association between personal networks and kin composition as well as religious beliefs. Finally, the emergence of personalized communities, fostering an association between large and diverse personal networks and the overall size of the extended social networks.

Wanna Be Friends? Patterns and Heterogeneity in Network Selection Mechanisms

Andrea Vest Ettekal (Tufts University), David Schaefer (Arizona State University)

Adolescent friend selection has important consequences for individual development and behavioral outcomes, such as engagement in risky behavior. Friendships can develop through numerous mechanisms (e.g., propinquity, homophily, transitivity), but what is the relative importance of these for observed friendships? This study has two aims: (1) identify the sets of strategies adolescents use to select friends and (2) test whether adolescents systematically differ in

which strategies they use. Using data from Add Health, we first estimated network change over time with a stochastic actor-based model (i.e., SIENA). Second, we converted estimated effects into standardized coefficients using Indlekofer and Brandes' relative influence method. This gives us the importance of each effect in driving observed friendships, compared to other model effects, while adjusting for the association between individual attributes and network position. For Aim 1, we compared deductive and inductive classifications of the relative influences of model effects. We find, for instance, that some adolescents tended to select friends based primarily on propinquity (i.e., peers in the same extracurricular activities and courses) while other adolescents selected friends based more on common behaviors (e.g., substance use). For Aim 2, we tested whether several sociodemographic, psychological, and developmental factors predicted which strategies adolescents used to select friends. We find, for instance, that it was students with higher (vs. lower) academic achievement who were more likely to select friends in the same activities and courses. These results help us understand patterns of friend selection behavior and how they differ across adolescents.

Interplay between personal morals with tie and cluster formation in a corporate communication network

Craig Evans (University of Illinois at Urbana-Champaign), Rezvaneh Rezapour (University of Illinois at Urbana-Champaign), Ming Jiang (UIUC), Jana Diesner (University of Illinois at Urbana-Champaign)

A long line of prior work has shown that natural language use can have an impact on the formation of ties and the structure of communication networks and vice versa. In that sense, the content of information exchanged between network participants can be considered as one among multiple features that influence homophily, among other network phenomena. A so far small body of previous work has focused on the relationship between sentiment, opinion, factuality, credibility and trustworthiness - among other characteristics of information content - and network structure. We extend this line of work and make a novel contribution to it by studying the interplay of individual morals, which can be influenced by both personal characteristics and constraints of individuals' surrounding culture, as represented in communication data and the evolution of ties and clusters in a communication network. As a starting point for calculating node-level moral, we reuse the Moral Foundations Dictionary, which originates from theoretical work in moral studies (Graham et al., 2011). This dictionary contains indicator terms for five pairs of basic virtues and vices: care versus harm, fairness versus cheating, loyalty versus betrayal, authority versus subversion, and sanctity versus degradation. We adjusted this lexical resource to our domain (business) and data (longitudinal email corpus), applied it to the content of the data, accounted for negations, and translated aggregated morality scores into node-level attributes, where nodes are individual senders and receivers of emails. We observe the averaged individual moral to be fairly stable despite changes in corporate performance. The concept of authority was observed to be the most prevalent among all tested categories in our data, followed by loyalty. For most categories, virtues are stronger represented than vices, expect for care versus harm, which feature about equally strongly in the data. In our talk, we also report on the relationship between homogeneity versus heterogeneity of personal moral in ties and clusters, and study this relationship over time. The proposed technique is novel and scalable, eliminates the need for manually annotating text data for moral, and overcomes limitations with inferring or relying on self-reported information on moral. However, validation of results computed over digital social trace data is often challenging as we lack a ground truth or gold standard. In this study, we compare our empirical results to a normative baseline for the magnitude of each moral category as derived from the code of ethics from the considered organization. We find the ethics code to be strongly focused on virtues as opposed to harms; serving as a face validity test for our approach.

Reference: Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology*, 101(2), 366-385.

Knowledge and experience in two-mode temporal networks.

Martin Everett (Manchester University), Chiara Broccateli (Manchester University), Johan Koskinen (Manchester University)

We consider two mode temporal data in which a group of actors attend a series of time stamped events. Actors benefit from the events they attend in two distinct ways. Firstly they learn from the experience of attending multiple events. Secondly they learn from interacting with other actors attending the same events who bring different experience from other events. We propose a measure and a resultant algorithm that tries to capture these features and measure the extent to which actors benefit from both of these. Examples in which this may be useful would be in career

trajectories, learning in educational environments or partaking in criminal or terrorist events. The result is a type of centrality measure but one that is very different from other measures and is linked closely to the type of data. The basic representation of the data is an extension of the Moody representation of a temporal line graph to a bi-dynamic line graph. In addition we try and establish which events provide the most benefit to the network as a whole by implementing an induced measure to capture the importance of the events.

Isolation and Apocalypticism: Anabaptists and the Munster Rebellion

Sean Everton (Naval Postgraduate School), Dan Cunningham (Naval Postgraduate School), Rob Schroeder (Naval Postgraduate School)

The Anabaptist movement is generally associated with pacifist groups such as the Mennonites, Amish, Bruderhof, and Hutterites. However, not all Anabaptists have embraced pacifism. Perhaps, the most violent episode occurred during the Protestant Reformation in the German town of Munster in 1534 (known as the Munster Rebellion) and was perpetrated by the Anabaptist sect that came to be known as the Munsterites although it is more accurate to think of the group as a schismatic sect of the Melchiorites (also known as the Hofmannites). In this paper we argue that the violence perpetrated by Anabaptists during the Radical Reformation depended on the interaction of three factors: charismatic leadership, social and geographic isolation, and apocalyptic beliefs. In particular, we contend that the violence perpetrated by members of the Anabaptist movement was limited to an isolated cluster of leaders, who were separated from other Anabaptists who did not embrace apocalyptic beliefs. We test our argument through an analysis of longitudinal social network data of Anabaptist leaders active in the 16th century, using both stochastic actor-oriented models (SAOMs) and qualitative comparative analysis (QCA).

Longitudinal influences of family, individual and community-level predictors on alcohol use in middle and high school

Brett A Ewing (RAND Corp), Jeremy NV Miles (Google), Joan S Tucker (RAND Corp), Dorothy L Espelage (University of Illinois), Harold D Green (RAND Corp)

This longitudinal study examines differences from middle school to high school in the influence of family, individual (including mental health), network and corresponding community-level predictors on alcohol use. Results are based on 3,481 5th-12th grade students from three middle schools and three high schools in the Midwest who completed in-school surveys between 2008 and 2014. Interacted, fixed effects models, clustered at the community-level, were employed to examine the associations of family, individual, network and community-level variables on alcohol use in middle and high school. Benefits of fixed effects models include inherent control for unobserved heterogeneity as each individual acts as their own control. In block models, sibling aggression, delinquency and anger differentially predicted alcohol use in middle school compared to high school such that these predictors were associated with a greater risk of alcohol use in middle school. While we found significant main effects for some community-level predictors we did not observe any differences in middle school versus high school in the block models. No significant main or interacted effects were found for our network measure (in-degree) at the respondent or community-level. In the final multivariable models only the main effects for parental monitoring (protective) and risky predictors (sibling aggression, delinquency, depression and community-level marijuana use) were statistically significant. While reduced block, fixed effects models identified differences from middle school to high school in individual and family predictors, multivariable models did not identify any differences in the association of these predictors across the two time points. Further research should focus on using longitudinal, fixed effects models to examine the relationship of family, individual and community-level factors in adolescents.

An Application of Input-Output Networks to Regional Economies

Tayo Fabusuyi (Carnegie Mellon University & Numeritics), Juergen Pfeffer (Carnegie Mellon University)

This paper addresses a practical problem often faced by economic development organizations using data from the Greater Pittsburgh area. Local economic development organizations are often tasked with promoting the health and vitality of the regional economy. However, the unique composition of each geographical area calls for a distinct approach that reflects the peculiarities of the local economy. The study presents an approach by which the information in input-output is modeled as social network. Information obtained from input-output analysis and conventional

metrics of economic development are enriched by the concepts and metrics of network analysis. We show how network metrics and visualizations can be used to provide insight on regional economies and provide an application to industry cluster analysis.

Information Diversity and Structural Diversity in a Changing Environment

Jesse Fagan (University of Kentucky)

In this study I examine the relationship between structural diversity and information diversity during the merger of two large, complex organizations over a 16 month period. A network of relationships is established by examining the frequency of email communication between organizational members in two equally large, international consumer goods firms immediately following the official integration. The diversity of information of the content sent and received by each organizational member is measured using a variety of methods such as topic analysis, vector space models, and clustering. Early findings suggest that in the midst of great changes, contrary to dominant theories on structural holes, there is an inverse relationship between structural diversity and information diversity. A higher density ego network is related to greater information diversity, consistent with a theory of bandwidth and diversity (Aral and Van Alstyne, 2011). As the organization settles this relationship changes in most parts of the network to one expected by structural holes theory. These findings suggest an important role for close ties during times of organizational change and development of advantageous structural positions following a merger.

Exploring temporal network measures and social connectivity in online interactions

Lucia Falzon (DSTG, Australia; University of Melbourne, Australia)

An ideal way to investigate information propagation over Twitter networks is to explicitly analyse the sequential order in which posts are transmitted. In contrast to prevalent network analysis methods in which dynamic networks are modelled as a series of static network snapshots, each recording the network structure at a specific point in time, this approach considers the finer granularity of dynamic interactions captured in time-stamped data on information sharing events and enables a more accurate analysis of online information flows, who generates them, and whom they might reach. Static, longitudinal and time-ordered measures for social networks have very different applications. The first type is mostly used to investigate long-term or stable relations and their persistent network effects, whereas analysis aimed at understanding network evolution necessarily requires longitudinal analysis; time-ordered measures are explicitly aimed at the study of network diffusion - the flow of information, resources, ideas, diseases etc. over the network. By its very nature time-ordered analysis is best suited to path-based measures, such as reachability, closeness, connectivity and betweenness. However, other positional measures, for example, the various types of centrality and structural equivalence, can be defined and calculated on the time-ordered reachability matrix, which is a particular representation of the connectivity relationships over the time spanned by the data collection. This set of measures gives an indication of positional significance of each actor in terms of aggregated network flow - a subtly different notion to the same measures obtained from the network of aggregated interactions. The reachability network is constructed from paths of sequential interactions, so there is an edge from one node to another if there is a time-ordered sequence of connections linking the two; whereas an edge in the aggregated network indicates that there is at least one direct interaction from one node to the other over the data collection time. The latter is a subset of the former. At any one time the Twitter sphere is composed of multiple overlapping networks: tweets linking hashtags and users; follower/followee networks; hashtags linked to other hashtags; user-to-user networks linked on the basis of common topics, exchanges in discussion threads or other connections that we may conceive. Any sort of Twitter network analysis therefore must begin with a scheme for network construction. The choice of construction depends very much on the analysis questions. Data collection entails the tracking of tweets via the Twitter API, according to a pre-designed policy tailored to the chosen network type. In this paper we discuss path-based dynamic network measures and time-ordered structures in Twitter networks, with a view to developing a basis for the analysis of online communication processes. Using examples from Twitter discussions, reflecting consensus or conflicting opinions about current events, we investigate observable changes in connectivity, intensity and temporal patterns and attempt to analyse these in the context of dynamic online communities and their actors.

Combining Policy Network and Discourse Network Analysis to understand Climate Change Advocacy Coalitions in Brazil

Leandra Fatorelli (University of Leeds), Monica Di Gregorio (University of Leeds), Peter May (Universidade Federal Rural do Rio de Janeiro (UFRRJ))

This paper investigates advocacy coalitions in the climate change policy domain in the land use sector in Brazil, to assess whether the climate policy domain effectively integrates the two responses to climate change approaches: mitigation (addressing the causes) and adaptation (reducing the impacts). Adaptation and mitigation have distinct features, such as time and geographical scales, yet in the land use sector scholars recognise the advantages to pursue integrated approaches to both exploit synergies and tackle possible trade-offs between the two strategies (IPCC 2007, 2014; Locatelli et al, 2015). In Brazil, mitigation in the land use sector started to be implemented in 2008 and policy debates are quite advanced, while the adaptation dimension is newer and the first National Adaptation Plan is still a draft policy document. Besides this difference on the pace of policy process between mitigation and adaptation, the Brazilian Policy on Climate Change stresses the integration between mitigation and adaptation strategies as a major policy guideline. The study is based on primary survey and interview data on 105 policy actors in Brazil collected between 2014 and 2015. The survey provided network information about communication and collaboration between organizations active in the mitigation and adaptation policy domains, while the interviews discuss policy actors' perceptions and beliefs about mitigation and adaptation frameworks, policies and measures, priorities and their opinions on integrating the two approaches. To investigate advocacy coalitions we use a discourse network analysis (DNA) approach (Leifeld and Haunss 2012; Leifeld, 2013) - which merges social network and text analysis - combined with interaction networks, through policy network method. We identified advocacy coalitions by: i) coding the interviews in the DNA software (Leifeld, 2011) and investigating the affiliation networks of organizational actors according to concepts/beliefs and ii) identifying subgroups based communication and collaboration direct networks; and they were grouped as following: 1) mitigation and adaptation policy actors X priorities and beliefs about to climate change mitigation related to reducing emission from deforestation and forest degradation (REDD+) 2) mitigation and adaptation policy actors X priorities and beliefs about Ecosystem-based Adaptation (EbA);

We then consolidated the analysis of the two strategies to assess the extent to which mitigation and adaptation sub-domains are integrated and to identify how belief systems and networking patterns co-determine whether coalitions and actors integrated or separated mitigation and adaptation actions. The development of policy network analysis on climate change using this combined method is relatively new in social network analysis (Broadbent and Vaughter, 2014; Babon et al., 2014) and it underlines the co-production of value systems and coordination amongst actors in the climate policy process. We further extend the knowledge in this research agenda by exploring a gap in coalition analysis based on both policy actors' interactions and beliefs to better understand the climate policy process.

Structural Consequences of Recoding Asymmetric Ties in Friendship Networks

Katherine Faust (University of California, Irvine)

This paper examines the structural consequences of imposing symmetry through recoding asymmetric choices in friendship networks. There are currently several different perspectives on the role of asymmetry in friendship relations, with different consequences for coding practices. Some people argue that, by its very nature, friendship is a symmetric social relation. One practice following from this perspective argues that a (mutual) friendship cannot exist between two people unless both agree that they are friends, thus non-reciprocated choices should not be coded as friendships. A contrasting practice from the same perspective argues that self-reports of network ties are error prone, so asymmetries in dyadic friendship choices are not unexpected, and a mutual friendship should be treated as present if either partner reports the friendship tie. From a different perspective, it is observed that friendship choices often are not reciprocated, and these asymmetries provide important information about status hierarchies in friendship relations. From this perspective, asymmetry should be maintained as a legitimate aspect of friendship, and there should be no recoding to impose symmetry. As a consequence of these different perspectives, there are different practices for recoding asymmetric ties in friendship networks, or for not recoding asymmetric ties at all. Both symmetric union recoding (a mutual friendship is taken to exist if either partner to the tie claims a friendship) and symmetric intersection recoding (non-reciprocated friendship choices are taken to indicate the absence of friendship and are recoded to be null) are used in practice, as is the absence of recoding. What are the consequences of these different coding practices for global properties of friendship networks? Using a sample of 54 friendship networks, this paper examines how different coding practices affect several graph level indices, including the number of edges, network density, the number of components, triadic closure, four common centralization indices, and the tendency toward a core-periphery structure. Results show that coding practices are consequential for detection of a number of graph

level properties, especially centralization and the tendency toward a core-periphery structure. Practical implications of these results are discussed.

Social networks and industrial rules definition during trade fairs

Guillaume Favre (University of Toulouse Jean Jaures), Julien Brailly (Swinburne University of technology), Emmanuel Lazega (Sciences Po Paris)

Despite of the development of communication technologies and dematerialization of cash flows, companies still need concrete meeting places such as trade fairs. We show in this presentation that trade fairs are more than tools to initiate international partnerships between firms, they are places for the organization of markets. Through the study of a fair in sub-saharan africa where buyers and sellers of television programs can meet, we seek to understand how this event leads to the emergence of a social milieu and participates in changing the rules for the tv programs distribution industry in africa. Through social network data of information exchanges between the fairs' participants collected by questionnaires, we show how these actors group with each other following national logics but also common stakes. More than a set of contact between buyers and sellers, the network analysis reveals a segmented market into groups with divergent stakes and different 'visions' of how this market should be ruled. We describe each of these groups stating their interests and positions in the relational structure and show that the dominant actors are able to influence the evolution of this market by controlling the trade fair's conferences.

Further Considerations For Strategies of Using Friend of Friends For Reaching Large Numbers of Others

Scott Feld (Purdue University), Vineet Kumar (Yale University), David Krackhardt (Carnegie Mellon University)

Previous research has shown that one can find disproportionately well connected people in networks by locating random friends of a random sample of people. However, the extent to which those "random friends" have more friends than the average person depends both upon the strategy of "random sampling" and the structure of the network. We focus on two distinct strategies of "random sampling of friends". Specifically, for each member of a random sample, we can either: 1) select a fixed number of random friends, or 2) give each friend of some person in the random sample an equal chance of being selected. We show that when the network is structured such that there is no association between a person's own number of friends and the average number of friends of his/her friends, then both strategies lead to the same expected number of friends of the sampled friends. That expected value is shown in Feld (1991), and we have called it the Global Mean. We also show that the expected number of friends of a sample drawn proportionally to the number of friends of each member of the random sample is always equal to that Global Mean, unaffected by the network structure. However, as we show in our previous paper presented here, a fixed number approach yields an expected number of friends of the friends as more/less than the Global mean depending upon whether the network structure has positive/negative "inversivity" (the correlation between the degree of one node with the inverse degree of the other node for all friendships). We show that inversivity is not fully determined by assortativity (the correlation between the degrees of the two nodes for all friendships), and that the inversivity can be positive even when assortativity is positive. Finally, we consider a third sampling strategy. Whenever the expected numbers of friends of a person's friends depends upon the numbers of friends of the person, one can maximize the expected number of friends of the sampled friends by only including the friends of those randomly selected people who are expected to have friends with the most friends. Whether it is more effective to use degree, inverse degree, or some other function of degree to best predict the expected degree of friends will depend upon the particular structure of the network. This third strategy leads to a much higher expected mean degree than the others whenever there is much variation in degree and a strong association between the degrees of friends. Finally, we suggest that further research might investigate considerations beyond expected degree for real applications of these sampling approaches; for example it might be useful to explore the effects of each sampling strategy on the sampling variation of mean degree, and on the expected number of different friends among the set of selected individuals.

The naissance and geographical spread of quantitative research into corporate interlocks

Meindert Fennema (University of Amsterdam), Eelke Heemskerk (University of Amsterdam)

Social Network Analysis made its most remarkable innovations in the early 1970s with the coming together of formalised graph theory and computerised computational capacities. The field of Interlocking Directorates research

was arguably the first to reap the benefits of this scientific breakthrough. This paper investigates the geographical aspects of the sociogenesis of what was to become a thriving domain of quantitative network analysis. Looking back we can see how brokerage in scientific collaboration networks allowed for 'neue kombinationen' and how closure within likeminded research groups allowed for the development of the building blocks of quantitative research into interlocking directorates. After Frank Harary had published in 1969 his monumental 'Graph Theory', a Dutch reviewer of that book who had worked with Harary during his sabbatical year at Ann Arbor, was the first to develop a series of computer programs to implement Harary's network concepts like diameter, density, cohesiveness of networks; betweenness, centrality, indegree outdegree of nodes; bridges and cutpoints. The library of these computer programs (see Anthonisse and Lageweg, 1975) was used to analyse networks of interlocking directorates among the largest corporations in The Netherlands (Stokman 1973; Helmers et al. 1975). The research was triggered by -and after a first draft publication in 1971 contributed to - a public debate about corporate power in The Netherlands. Around the same time application of mathematical graph theory attracted attention of social scientists in the USA and in France (White, 1970; Sonquist and Koenig, 1975; White, Boorman and Breiger, 1976; Bourdieu et De Saint-Martin, 1978; Useem, 1978; Koenig, Gogel and Sonquist, 1979; Mizruchi and Bunting, 1979). Initially the quantitative network analysis was conducted simultaneously in several countries and universities, because there was not yet a network of network analysts. Sonquist and Koenig used the computer programs of Richard Alba (1973), in which the structural unit is the N-clique. Bonacich (1972) developed a technique for analysing overlapping memberships. In 1975 Ronald Breiger received a PhD from Harvard University. His dissertation was on "Dual and Multiple Networks of Social Structure". On his committee were Harrison White and Mark Granovetter. In the second half of the 1970s, however, the thriving field of social network analysis build its foundational institutions. Interesting to note is that the driving forces came from different geographical regions. In 1977 the International Network of Social Network Analysis was founded by the Canadian scholar Barry Wellman (1988). And in 1978 the journal Social Networks was founded, with Linton C. Freeman from Lehigh University as editor, J. Clyde Mitchell from Oxford University and Rolf Ziegler from the University of Munich as co-editors. Among the Editorial Board we find scholars from the USA, Canada, Germany, France, Norway, Denmark, Israel and The Netherlands. Although geographically diverse, the French scholars are not integrated; the name of Pierre Bourdieu is missing.

Partners in crime? A theory of corruption as a criminal network: evidence from a lab experiment

Romain Ferrali (Princeton University)

How does the structure of social relationships among bureaucrats affect corruption? Empirically, corruption varies in form, from individual acts to vast conspiracies. I explain this variation through a network model of corruption. Bureaucrats are embedded in a network on which they form a criminal conspiracy: a bureaucrat finds an illegal opportunity to make money, and decides whether to recruit accomplices. Accomplices protect the bureaucrat, non-corrupt neighbors witness and denounce criminals. The model predicts that as states get better at punishing it, corruption decreases by weeding out petty corruption, and involves more accomplices: tougher punishment makes protection more attractive; petty corruption disappears because it is not profitable enough to afford recruiting accomplices. Isolated agents are more corrupt, as they form "enclaves" that create fewer witnesses. Increasing density reduces corruption only if it breaks down these enclaves. I test these predictions with a lab experiment conducted in Morocco in September 2015. The experiment confirms the model's main predictions. It also shows that behavior is more strongly affected by institutional opportunities for collusion than prior interpersonal ties.

Difficult People: Who is Felt to Be Demanding?

Claude Fischer (University of California, Berkeley), Shira Offer (Bar Ilan University)

Researchers have long pointed to "negative" ties as important but understudied links in individual networks. Some studies suggest that their presence is more consequential than are supportive alters, in affecting individuals' support and psychological reactions. Yet, we have a limited understanding of how such relationships fit within egocentric networks: who these alters are and what other kinds of connections they have to egos. Fundamentally, why would a negative tie persist? We analyze newly-collected data (UCNets) on the networks of over 800 respondents (samples of twenty-somethings and of 50-to-70 year-olds) each of whom provided, on average, about 11 names in response to several name-eliciting questions. One of those questions is: "There are sometimes people we know who ask a lot of us, who are sometimes demanding or difficult. Who are the people that you sometimes find demanding or difficult?"

Initial analysis [note: the final 100 or so cases are not yet in but will be included in the delivered paper] shows, for both age groups, that mothers, sisters, and spouses or boy/girl friends were, all else equal, substantially likelier than others to be listed as “difficult.” In the 21-to 30-year-old subsample, respondents also listed as difficult people whom they reported helping. Respondents in the 50-to-70 year-old subsample also listed as difficult adult children, coworkers, and people whom they had known for more than a year. Other attributes of the ties mattered little or were unsurprising (e.g., alters whom respondents labeled “friends” were less likely to be nominated as difficult). Ego traits were largely unassociated with naming more difficult alters (except that older respondents in bad health were likelier to do so). These data suggest that the short answer to why negative ties persist is that they are either normatively hard to drop—close kin—or practically hard to drop—coworkers. An additional dimension is that respondents were likelier to name female than male kin—mothers, not fathers; sisters, not brothers—as demanding.

Abandoning innovations: network evidence on enterprise collaboration software

Jacob Fisher (Duke University), Yong-Mi Kim (Duke University), Jonathon Cummings (Duke University)

The diffusion of innovations is a central problem in the study of social networks. Although a considerable amount of attention has been paid to when innovations are adopted, few studies have considered the reverse process of when innovations are abandoned. We examine this process among employees in a large technology company using a unique dataset on the use of an enterprise collaboration system - an innovative software tool used to help employees collaborate with one another. The data consider a bipartite network of over 49,000 employees connected by over 26,000 communities, over a time period of around 4 years. Using timestamped data on posts to the software, we construct a real-time measure of when an employee begins using the software and ultimately abandons the software. We find that employees are more likely to stop using the software when the software has lesser value for them. Value is measured as the number of other users of the software. We consider value both locally - the number of other users that someone is connected to - and globally - the number of users in the company as whole. Our findings shed light on use in different areas of an organization can cascade into widespread adoption or abandonment, and on the diffusion of innovations process as a whole.

Intra-organizational Tie Preservation and Dissolution during Crisis

Sean Fitzhugh (US Army Research Laboratory), Arwen Decostanza (US Army Research Laboratory)

Communication ties afford access to valuable information and resources, but these advantages require the cost associated with the duties of maintaining that tie. Preserving this balance is essential in organizations executing complex tasks that require coordination and continuing communication. Crisis circumstances exacerbate the challenge of maintaining this balance by placing individuals in disrupted task environments that typically 1) increase the communication load necessary for efficient task execution and 2) increase the cognitive load necessary for any one individual to carry out his/her duties. At once the individual experiences a great increase in the value of preserving essential ties and dissolving redundant or unnecessary ties. Here we examine communication ties within a military organization performing multifaceted, interdependent tasks prior to and during a crisis event in order to identify patterns of tie preservation and dissolution during crisis. Using dynamic models of the evolving network, we assess the impact of role assignment, individual performance, perceived colleague performance, preferential attachment, and homophily on maintaining and severing communication ties. The results will demonstrate which theories of organizational communication hold up during periods of crisis.

Social Network Ethnography: Doing qualitative network analysis in a gang neighborhood in Central Illinois

Mark Fleisher (Case Western Reserve University)

A six year ethnographic and friendship network study of 74 female gang members in Champaign, IL, used culturally sensitive name generators, culturally valid definitions of degrees of friendship, and a multi-wave sampling design in combination with field-based informal, semi-structured and structured interviews on sociological, socio-sexual, socio-psychological domains. Contrary to popular thought on the composition of youth gangs, ego network analysis found that approximately 50 percent of each of the 74 friendship networks were composed of members of gangs different from egos'. Participant observation fieldwork helped clarify the social, economic, instrumental, gang, and affective

relations of same-/different-gang network composition. Friendship network analysis combined with ethnographic data were analyzed, integrated, and published in: *Living Black: Social Life in an African American Neighborhood* (University of Wisconsin Press, 2015).

Knowledge networks of top managers in the fashion industry: The relational embeddedness

Alexander Fliaster (University of Bamberg), Sonja Sperber (University of Bamberg)

Past research has revealed that social networks play a decisive role for the sharing and creation of new knowledge and thus essentially contribute to innovation (Moran, 2005; Zheng, 2010; McEvily et al., 2014). However, while previous studies have focused primarily on networks among R&D scientists, engineers and business consultants (e.g. Cross & Cummings, 2004; Tortoriello & Krackhardt, 2010), much less attention has been dedicated to another key innovation actor - the top management. With regard to top management networks, previous research has primarily addressed top management teams (TMT). For instance, Collins & Clark (2003) revealed that range (diversity) of internal TMT networks is significantly related to corporate stock returns. In addition, from the intra-organizational perspective, Fliaster & Golly (2014) have shown that in innovative medium size companies, top managers create strong ties with a small number of top performing blue-collar workers. Other studies found that managers who score higher on transformational leadership tend to hold more central positions in the organization's informal advice and influence networks (Bono & Anderson, 2005). Last but not least, from the inter-organizational perspective, past studies have explored the role that board interlocks play in the diffusion of innovations, such as shareholder rights plans and other corporate governance practices (Davis, 1991; Shipilov et al., 2010). Despite these inspiring insights, however, the question of how top managers acquire and share innovation-related knowledge with network contacts from both inside and outside their organizations has not yet been explored systematically. More specifically, three research gaps can be identified from the literature review. First, while past studies have addressed top managers' advice networks within their organizations, much less is known about their external knowledge ties that cross organizational boundaries as well as the role of private ties (e.g., family and friends). Second, only little is known about which kinds of informal ties (e.g., strong versus weak ties) are particularly deployed by top managers to acquire new knowledge. Third, whereas innovation studies show that for successful innovations various kinds of knowledge (such as market and technological knowledge) are needed, the insights about which kinds of knowledge are actually acquired by top managers via various informal network relations are still very sparse. Our paper addresses these research gaps theoretically and empirically by analyzing informal knowledge ties of senior executives in the European fashion and accessories industry. In doing so, we draw on the concept of relational embeddedness (Granovetter, 1992) and focus on resourceful contacts (alters) and resourceful ties of top managers (e.g. Gabbay & Leenders, 2001; Uzzi, 1997). Based on this theoretical framework, we explore ego networks of upper echelons in the fashion and accessories industry empirically by conducting 22 semi-structured interviews with managing directors and other top executives from 11 leading European companies, such as Escada, Hugo Boss, and Montblanc. In addition, we have extensively analyzed other sources of information, such as industry and corporate reports, industrial rankings etc. We present the main results of this explorative study and identify its important implications from both research and managerial perspective.

Metacommunicative Grammars in Sexual Encounters: Indexing HIV Status across Migrant and Local Sexual Networks

Jorge Fontdevila (California State University Fullerton - Sociology Department)

Semiosis or signification in social life may occur when signs correspond to denotational objects (referential theory of meaning), when signs relate to each other via contrasts in sign-systems (self-referential theory of meaning), or when signs produce interactional effects on sign users (indexical theory of meaning). Of these, only the indexical mode of signification has the capacity to anchor the other two—the referential and self-referential modes—in pragmatic contexts of everyday life. Thus indexical signs render semiotic processes—linguistic and non-linguistic—fully operational in communicative practice, providing the necessary redundancies and informational cues to interpret and decode messages (i.e., reduction of uncertainty). Grammaticalized indexes or indexical elements (e.g., pronouns, deixis, shifters, status markers, code-switchings, accents, conversational silences, prosodic rhythms, stylistic variations) are used reflexively by sign users to lay out the contextual parameters within which their social interactions take place and to constitute the very nature and footings of the relationship ties involved in a social encounter. Thus indexes are key to metacommunicate what is interactionally “going on” because they provide more or less tacit cues or instructions to sign users on the level of abstraction at which any message should be decoded. Moreover, indexes are

not generated by sign users ex nihilo anew in each encounter but emerge and circulate in complex linguistic political economies embedded in power differentials across complex network topographies and shapes. So in addition to a relevant semiotic-indexical dimension, I argue that communicative phenomena are constituted by a power (consensus versus conflict) and a relational dimension (face-to-face versus network spread). Ethnographic methods are especially well suited to uncover and explore all these indexical communicative mechanisms and dimensions that metaframe social interaction and that emerge from broader power matrices and network topographies of practice and discourse. In this connection, based on ethnographic research among gay and bisexual Mexican immigrant men in Southern California, I find two contraposed metacommunicative indexical grammars that distinctly frame these men's sexual encounters and that have significant implications for HIV transmission. On the one hand, a metacommunicative grammar anchored in migrant sexual networks of health responsibility where silence and HIV nondisclosure indexes HIV negative serosorting. On the other, a metacommunicative grammar anchored in local sexual networks and sexual marketplaces of individual responsibility where silence and HIV nondisclosure indexes HIV positive serosorting. I argue that metacommunicative misunderstandings during sex across sexual networks constitute a significant social driver of HIV transmission. I conclude by arguing that indexes lie at the nexus of semiosis and communication in social life. Thus indexes constitute the primitives of meaning production in social context.

Wikis and Work Groups: A Social Network Approach to Predicting Community Growth

Jeremy Foote (Northwestern University), Aaron Shaw (Northwestern University), Benjamin Mako Hill (University of Washington)

Large peer production projects, such as Wikipedia and open source software, work surprisingly well in creating useful, large scale, and high quality artifacts. However, the vast majority of peer production projects fail to gain contributors or contributions. Because network scholars have focused on the rare successful projects, there is very little research on the factors that predict project growth in the first place. We approach this question by examining the network structures and participation dynamics of a diverse population of peer production communities as they are just starting.

Early stage peer production communities resemble two types of collaboration networks: work groups engaged in information sharing and voluntary attempts at collective action. The literatures on these topics provide very different predictions about what sorts of factors should be important in predicting community productivity and growth. In order to better understand the determinants of effective collaboration in peer production, we test predictions from both literatures in a large population of peer production projects.

According to models of collective action, individuals make sequential decisions about how much to contribute to a collective good based on the current status of the good's production. This literature predicts that projects which have a critical mass of dedicated contributors, and which are growing quickly, are likely to grow quickly in the future. In other words, higher tempo and larger scale participation are positively associated with building collective action.

Alternatively, the performance of work groups engaged in information sharing tasks depends on the structure of participation. The work group literature has found that dense, non-hierarchical interaction structures are associated with more productive group performance. Because both work groups and new peer production projects are small groups of individuals engaged in collaborative sensemaking to produce a shared artifact, we might expect that these same structures would also lead to more productivity from new peer production communities.

To test these claims, we create collaboration and communication networks for 2,555 wiki communities hosted on the website Wikia.com. At the point when each wiki had received 500 total edits we construct measures of early-stage network structure and participation dynamics. We find that early interaction structures have very little impact on eventual productivity (as measured by total edits) or community growth (as measured by total contributors), once we control for the size of the networks and how quickly the community is producing content. Rather, we find that the speed at which content is being produced, as well as the number of active editors predict both productivity and growth. These results provide evidence that early peer production projects look more like collective action than like work groups.

Network Relationships and Job Changes of Software Developers

Dawn Foster (University of Greenwich), Guido Conaldi (University of Greenwich), Riccardo De Vita (University of Greenwich)

This presentation will look at job changes of software developers within an open source software community using relational predictors of job change activity to model the actions of the actors involved. Interactions with other actors on mailing lists and in software contributions will be used as predictors.

Open source software is developed in the open where anyone can view the source code and anyone with the knowledge to do so can contribute to the project. Because people from around the world work on these projects together using online tools with publicly accessible interactions between people, it is a relevant setting for studying job changes using Social Network Analysis to understand and model the network relationships between individuals both before and after a job change.

Solidarity or Schism: Ideological Congruence and the Egyptian Activists' Twitter networks

Deena Abul Fottouh (McMaster University)

Scholars of the role of social media in protest disagree about whether social media reflects conditions on the ground. This paper uses social network analysis to examine an important case of social media and protest: the Egyptian revolution of the Arab Spring and Twitter networks among protestors. The Egyptian revolutionary movement witnessed different phases of solidarity and schism. At the beginning of the revolution in Tahrir Square where people camped for three weeks in 2011 till the deposition of President Mubarak, there was euphoria of unity across different ideological groups. Four years later, one can easily recognize a movement that is highly ideologically polarized. My research uses social network analysis to study whether the periods of solidarity and schism are mirrored online by looking at how ideology shapes the Twitter network structures of Egyptian activists over time. The research builds on Social movements theory of coalitions emphasizing the role of ideological congruence in movement solidarity and stretches it to the realm of digital activism. Building on the "model change" school of thought in digital activism, this research overrides the role played by Twitter as a scale-shift mechanism that helped speed mobilization during the Egyptian revolution. It rather studies its role as an organizational and networking tool by looking at how ideology shaped the Twitter activists' networks at the beginning of the revolution in 2011 and four years later. Social network analysis of tweets collected over two different periods of time show that the structures of the Twitter mentions networks of the Egyptian activists did match what was happening in the streets. Egypt witnessed a united movement at the beginning of the revolution where heterogeneous ideologies deliberated freely online and formed a common counter-culture. Four years later, the united movement became more fragmented, and that was reflected in the Twitter networks. Sub-group analysis of the Twitter mentions networks show that there was a big core of bloggers of different ideologies connecting to each other at the beginning of the revolution while the later Twitter networks were more ideologically divided. Ideology started playing a role in determining who mentions whom and the level of homophily of each activist during the later phase of the revolution. This showed in the analysis of network level, group level and individual level homophily. While other studies which investigate Retweet networks show that the followers of the Egyptian Muslim Brotherhood are more tightly connected and expressing themselves "in unison" than the secularists, the mentions networks studied in this research show that there was no specific ideological group driving towards homophily at the beginning of the revolution while the liberals were more homophilous in the later phase. Building on social network analysis of Twitter networks of activists, this research shows that Twitter networks are a good barometer of not only protests as previous research shows but also of the patterns of networking and ideological homophily in a revolutionary context that swings between moments of solidarity and schism

Bitcoin: the network structure of a decentralized financial network

Ethan Fridmanski (University of Notre Dame)

The goal of this project is twofold. First, to analyze the differences between decentralized and centralized networks. Second, to understand these differences in the context of financial networks. Traditional financial networks are highly centralized because of organizations such as banks, which serve as intermediaries between two transacting individuals. In a more decentralized financial network there are more direct peer to peer transactions. This means individual A would be able to transact with individual B without the need of the intermediating entity C. To study the differences between centralized and decentralized financial networks I will analyze cryptocurrencies, specifically, Bitcoin. Bitcoin exists as a software protocol which can be run by any person in the world. It does not rely on central organizations like banks, so individuals are allowed to transact directly with each other and are responsible for storing their wealth

by maintaining their own personal address. This marks an important shift in how we think about money and gives users more control of their personal wealth.

The data used in the project is the whole Bitcoin transaction network from its inception in 2008 to October 2014. The data is time ordered and includes nodal attributes such as the time of the transaction, the Bitcoin address for both the sender and recipient, and the balance of each address after the transaction. I am also able to estimate the amount of each transaction with this data. I expect to find that the Bitcoin transaction network will be less centralized than we would expect by random, meaning that users will have to go through less intermediaries to reach other users. I will also see how the centralization of the network changes over time, as more users adopt it, and during changes in its value. Following the analysis, I will discuss the sociological implications of having a decentralized global financial network, were Bitcoin (or some other cryptocurrency) to reach mass adoption.

A Formal Theory of the Evolution of Social Power: Natural Trajectories of Interpersonal Influence Systems along Issue Sequences

Noah E. Friedkin (UCSB), Peng Jia (UCSB), Francesco Bullo (UCSB)

This article reports new advancements in the theory of influence system evolution. It extends theory on the single-issue opinion dynamics of a group, which has been the focus of most research in the field opinion dynamics, to develop a theory on the evolution of small deliberative groups assembled to deal with a sequence of issues in an issue domain. Such groups are a characteristic feature of social organization. Our theory and evidence points to the existence of a reflected appraisal mechanism that alters individuals' levels of closure to interpersonal influence along issue sequences in correspondence with their prior influence centralities. This elementary mechanism modifies the direct and indirect flows of influence in the group and, we show, that it tends to concentrate influence centrality on one group member.

Understanding the size and spread of Chinese NGO networks: Capacity and board affiliations

Sophia Fu (Northwestern University), Michelle Shumate (Northwestern University)

In recent years, research on digital interorganizational networks among Chinese nongovernmental organizations (NGOs) has boomed. Limited research, however, has studied Chinese NGOs' networks offline. To fill this gap, the current research investigates the size and spread of offline Chinese NGO networks. In particular, we examine two competing hypotheses: the influence of organizational capacity and the influence of board affiliations as *guanxi* on the size and spread of NGOs' ego-centric networks.

From a resource-based view (Bryson, Ackermann, & Eden, 2007), organizational capacity should be related to the size and spread for NGO networks for two reasons. First, NGOs with greater organizational capacity may have greater resources available to contribute to collaborations, especially geographically dispersed ones. Second, NGOs who have a greater organizational capacity may be preferred partners, as other NGOs seek to improve their competencies.

In contrast, our *guanxi* hypothesis suggests that board of directors serve as an intermediary between an NGO and another organization where their board member is affiliated. As such, an organization's board of directors serves as the *guanxi* to facilitate the cultivation of an organization's networks. They are the common third-party for the focal organization with other organizations to develop interorganizational networks. Thus, board of director is the mechanism of attracting and developing organizational partners for Chinese NGOs.

To test our hypotheses, we conducted surveys among 119 Chinese NGOs. Our findings provided support for our *guanxi* hypothesis; the number of organizational affiliations that members of the board of directors have is positively related to the size of Chinese NGO networks, controlling for the geographic region, social issue areas, and revenue of the NGOs. As such, we highlight the significance of boards of directors acting as *guanxi* to attract NGO partners. Further, we find that although board linkages partially explain the size and indirectly influence the spread of the NGO ego-centric networks, via a relationship between network size and spread, the spread of the networks is also influenced by organizational factors. These factors include organizational culture, social issue, and geographic region.

This research makes three contributions to the study of Chinese interorganizational communication networks in general and to Chinese offline networks, NGO capacity, and *guanxi* culture in particular. First, this research marks an introductory step to the study of interorganizational networks among Chinese NGOs offline. Second, we empirically

examine the relationship between Chinese NGOs' capacity and the size and spread of their interorganizational communication networks. Our findings counter the resource-based view that NGO networks are primarily formed to gain access to new competencies. Instead, we suggest that the size of Chinese NGO networks is driven by interpersonal network ties and the geographic spread is related to the size of those networks, the organization's culture, the social issue the NGO addresses, and the local availability of partners. Third, we highlight the unique *guanxi* culture that shapes offline Chinese interorganizational networks. Our research suggests that board of directors serves as *guanxi* for NGOs to accumulate social capital and achieve organizational goals.

Multiplex networks among organizations catering to young MSM: Competition, collaboration, and funding relations

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This study examined multiplex networks composed of competition, collaboration, and funding among venues where young men who have sex with men (YMSM) participate. The mechanisms of "niche overlap" and "structural equivalence" were hypothesized to account for competition/cooperation. The dimensions of niche overlap tested were overlap in venue type (risk, social, and health-oriented), geographic proximity, social media site use, and funding sources. Also examined were the conditions under which competition was accompanied by collaboration. Data were obtained from 58 venues in Chicago and 80 in Houston in 2013- 2014. Due to the inter-dependent nature of the observations, multivariate exponential random graph models were used. It was found that, in Houston, independent of controls, venues of the same type competed, whereas, in Chicago, venues that shared online networking sites competed. Both Chicago and Houston venues with relational patterns more similar to other venues in terms of competition and collaboration competed. Some Chicago and Houston venues relied on similar funding sources, but, contrary to previous work, this was not accompanied by collaboration to increase the overall size of funding pools. Our study provides solid evidence for the importance of system-level interventions that encourage organizations that deliver health promotion and disease-prevention services to collaborate to provide more cost-effective programs, especially those venues with the shared goals of improving HIV prevention services for YMSM.

Study Conversation, Study Advice, and Goods Borrowing Networks in a Japanese University Class

Hideki Fujiyama (Dokkyo University)

This paper examines the following three different networks in a Japanese university class: 1) the "study conversation network" represents an ordinary and easy communication tie among students; 2) the "study advice network" is a more serious relationship. Following Blau's (1964) social exchange theory, this relationship is more difficult than ordinary communication; 3) the "goods borrowing network" is a more general communication with others than study conversation or advice.

The networks data were collected in the spring and fall semesters in 2013 and 2014 and in the spring semester in 2015. In each semester, there were three observation points. On average, there were 26 students in the class. At the beginning of the semester, the personality of students was measured by questionnaires.

From the descriptive statistics of networks, the following findings were identified: Reciprocity is high in both the study conversation network (0.57) and goods borrowing network (0.58). In contrast, the study advice network was low (0.348). (The number in parentheses is the value of statistics). This fact corresponds to the asymmetric property of the advice network. Similarly, transitivity is also high in both the study conversation network (0.44) and goods borrowing network (0.44). However, the study advice network is low (0.34).

Using Stochastic Actor-Oriented Model (Snijders et al. 2010), network dynamics were examined. This was implemented by RSiena.

The following common properties to all three networks were found: (1) Non-visible characteristics except for grade point average (GPA) have little impact on network dynamics; (2) Visible characteristics (gender and grade) have

an impact (homophily of gender and grade); (3) Network effects (reciprocity, transitive triplets, in-degree popularity, out-degree popularity) have strong impacts. Co-evolution of two networks was also examined: (4) If there is a tie between two agents, there is then a strong tendency that other, different qualitative ties also tend to be created (network homophily).

As for the different properties of each network, (5) the reciprocity effect in study advice networks disappears if other network effects are controlled. (6) In the study conversation network and study advice network, there is a tendency that if an agent receives a directed tie from others, then the agent tends to create a tie of different quality (reciprocity with other networks). However, in the goods borrowing network, there is no such an effect. (7) For the advice network, using descriptive statistics, transitive triplets are lowest in the three networks, but in a coefficient of network dynamics, the value is highest. This creates a puzzle for descriptive statistics and dynamic processes.

The results of this paper can be summarized as follows: (i) For creating communication ties among Japanese university students, network structure is very important but not homophily of personality; (ii) In addition, there is a strong "network homophily," i.e., if two agents have a common network tie then they are inclined to create a different type of tie; (iii) Compared with study conversation network, advice networks have more asymmetric properties, and goods borrowing networks are less affected by others' approaches in different quality networks.

Spatial Capital: Applications for the Study of Urban Inequality

Joseph Galaskiewicz (University of Arizona), Kathryn Freeman Anderson (University of Arizona), Kendra Thompson-Dyck (University of Arizona)

The main thesis of the paper is that the spatial organization of metropolitan areas, i.e., residents' and organizations' spatial positions in the urban system and the spatial networks that connect them to residents can yield advantages or disadvantages to individual actors. This, in turn, results in what Logan (2012) labels spatial inequality, or the unequal access or exposure by different population subgroups to valued resources in their community. Some residents have better access to jobs, amenities, shopping, etc. and some retailers and employers have better access to customers and employees, because of their location and transportation resources.

Drawing inspiration from network theory, geography, and architecture, we argue that spatial inequality is embedded in the urban design, which is the configuration of households and organizations in urban space and the various paths available to connect them. The imagery is one of a network where places (or locations or points or parcels) are nodes (defined by x and y coordinates) and the streets, subway/rail systems, sidewalks, rivers/canals, etc. that connect places are the arcs. Because the urban design also includes buildings - some of which are multi-storied, we can speak of a third, vertical spatial dimension connecting places with elevators, escalators, and stairways (defined by z coordinates). That is, the distance between two places is three dimensional. The system is dynamic because people and organizations move through the network from one place to another with the volume of flows varying depending upon the day of the week and time of day.

Actors have spatial capital if they have the ability to effectively and efficiently access diverse elements in the urbanized area that provide them benefit (Marcus, 2010). For the most part, the positioning of places and transportation routes are fixed; it is the actors that flow. But actors' ability to move from place to place through the transportation grid is a function of the transportation and information technology available to them. Thus, actors' spatial capital is a function of the urban design (or where valued organizational resources are situated and how they are connected), where actors are located, and their control over transportation and information technologies that can inform them and transport them through the network.

The metaphor of urban life is of a multi-actor, multi-dimensional treasure hunt. If residents in some metropolitan areas are better able to access the treasures than in others, residents in the former may enjoy certain benefits not realized in the latter. If the transportation system is more efficient and residents have transportation and communication technologies, then residents can live anywhere they want and still be successful in accessing valued organizational resources within their metropolitan area. In contrast, if transportation networks are less efficient or residents lack the appropriate technologies, then residents will be more constrained in what they can access thus will be disadvantaged.

In the paper presentation we will articulate our theory of spatial capital, describe how this contributes to various forms of inequality, and present data to support our claims.

Social influence models in community setting: the case of post-disaster mental health

H. Colin Gallagher (University of Melbourne, Psychological Sciences), Dean Lusher (Swinburne University of Technology), Richard A Bryant (University of New South Wales), Peng Wang (Swinburne University of Technology), Lisa Gibbs (University of Melbourne), Philippa Pattison (University of Sydney)

Statistical models for social networks (e.g., SAOM, ERGM) have been increasingly used to address questions of mental health outcomes, with longitudinal network models often directed at questions of the co-evolution of network ties and mental health processes and outcomes. Despite the inherent advantages of social selection models and longitudinal models, practical limitations on data collection often restrict their use. As such, cross-sectional models of social influence have considerable practical usefulness in settings in which the central point of interest is in predicting individual outcomes among a network of interdependent actors, yet in which longitudinal data are not (yet) available.

One setting in which a cross-sectional network models may be of considerable practical value are in disaster-affected communities. Disasters are a major cause of mental health problems worldwide. However, despite the immense empirical evidence for their negative effects, there remains a poor understanding of the social dynamics of affected communities following natural disaster, and how social network structures may affect mental health outcomes. In the present study, we employ a sociocentric (whole-network) approach to examine the extent to which social networks following disaster are associated with mental health outcomes.

We apply a social-influence type model, namely autologistic actor-attribute models (ALAAMs) for directed networks – to the prevalence of psychological distress within a network of close emotional ties among 558 members of communities in southeastern Australia affected by the 2009 Victorian Bushfires, as part of the Beyond Bushfires study (www.beyondbushfires.org.au). Results reveal differing network patterns for two common post disaster mental health issues: depression and post traumatic stress disorder (PTSD). As expected, both conditions are associated with less network connectivity. However, depression is autocorrelated within the network, suggestive of selection and/or influence processes. PTSD is not autocorrelated, instead associated with brokerage positions and vicarious, network-mediated disaster impacts. Additional complex network tendencies are also found, indicating the potential importance of sociological concepts of reciprocity and exchange systems when considering mental health. We argue for the need to employ sociocentric network techniques to uncover important network tendencies in the prevalence of post-disaster mental health outcomes.

On Data Quality in Big Corporate Network Analysis

Javier Garcia-Bernardo (University of Amsterdam), Frank Takes (University of Amsterdam), Eelke Heemskerk (University of Amsterdam)

New datasets on corporations and their relationships allow us to investigate standardised information on millions of firms. This enable us to study large networks of corporate governance, instead of small subsets. Using the complete information we could go beyond our current understanding of how the global economy is organised, analyzing patterns that are not evident when only samples of the network are studied. However, with big corporate network datasets come big problems as well. Careful examination reveals the importance of data quality. Good methods applied to unreliable data produce erroneous results, and the available data is far from complete for small companies. Data meets high quality standards if it is accurate, consistent and complete. Given the size of the data, case by case verification is infeasible, meaning that automated techniques using metadata and external data sources need to be employed. The corporate network analysis community still lacks norms and techniques for such automated processes.

We suggest several ways to automatically assess the quality of the data. Firstly, interactive visualizations can be used to find both outliers and patterns in the data. Secondly, merging the database with small, although complete, external sources allows us to find the factors affecting data quality, such as company size, GDP or population. Finally, those factors can be used to extrapolate the quality of the rest of the database. To show our approach, we applied our framework to the Orbis database, analyzing the way metadata was incrementally added in the last ten years. Using the aforementioned methods we present an overall assessment of the data quality of our dataset of 170 million firms.

Rethinking distance in international trade: World Trade Atlas 1870-2013

Guillermo García-Pérez (Universitat de Barcelona), Marián Boguñá (Universitat de Barcelona), Antoine Allard (Universitat de Barcelona), M. Ángeles Serrano (Universitat de Barcelona)

International trade moves annually trillions of dollars and represents one of the main networks of interactions between countries in the world. Along economic size, geographic distance has traditionally been recognized as one of the major factors shaping trade interactions but its importance is currently under scrutiny. On one hand, recent developments in information and communication technologies –like the revolution mediated by the Internet– lead some to claim the death of distance. On the other, the classical gravity model of trade –based on geographical distance– is extremely poor at predicting the existence of trade connections between countries despite its success in replicating bilateral trade volumes. One of the reasons for this is that geography is not the only factor that defines distance in international trade. Distance matters but along many dimensions: cultural, administrative or political, economic, and geographic.

In this work (arXiv:1512.02233), we use a network science approach to infer effective trade distances from historical data as a measure of the likelihood that two countries become connected in trade space. Trade distances, as a reflection of aggregated trade barriers, incorporate the different dimensions that affect international trade, not only geography, and allow us to represent more than a century of international trade history in the collection of maps conforming the World Trade Atlas 1870-2013. The maps are annual and cover a time span of fourteen decades. The collection as a whole is released as the sets of coordinated locations of countries in trade space, as trade distance matrices, and in spatial projections included in an online interactive tool available at <http://morfeo.ffn.ub.edu/wta1870-2013>.

Beyond the obvious advantage of visualization, the World Trade Atlas 1870-2013 advances our understanding of the long-term evolution of the international trade system. As main results, we find that the gravity law shapes the architecture of connections in the international trade system when implemented in trade space; which is not flat, but hyperbolic. The departure from flatness has been increasing since World War I, meaning that differences in trade distances are increasing and becoming more hierarchical, with a sharp and persistent stratification according to economic size. Besides globalization and localization, hierarchization is also a fundamental force shaping the international trade system, with countries being more interconnected than they have ever been and, at the same time, more clustered into hierarchical trading blocs than ever.

Socio-technical Change and Social Networks: The Case of Women Workers in the Ready Made Garment Sector of Bangladesh

Kaberi Gayen (University of Dhaka), Robert Raeside (Edinburgh Napier University)

As societies pass through stages of development then it is implied that the nature of social networks change. As a society moves through socio-technical change, for an example, from an agrarian base to an industrial base then population drift to urban centres occurs. This is a social disruptive process in which former community networks collapse. Those who are unable to move, their social networks become depleted, sparse and less functional. While those who move, form new networks and thus support system; often, ones who are institutionally based, form their networks around the workplaces - traditionally networks have often shrunk and the nuclear family becomes the unit of society. However, in many developing societies, the speed of change is dramatic and the consequences are disruptive. In this paper, we take a small world perspective to investigate this change using social network approach and aspect of societal change in Bangladesh. The early part of the twenty first century in Bangladesh, there has been an astounding growth of the “Ready Made Garments” sector. This industry is located mainly around Dhaka, employing mainly young women and making a sizable contribution to Bangladesh economy. Much of this women workforce has left husbands and children behind in rural villages to take up intensive work in the garment factories in the Mega City Dhaka. Here they live in clustered shanties, where they have to share a living space with other workers - for example, toilet with up to 22 people and a room with 3.5 people. Without doubt this is a disruptive change of considerable magnitude of their social network. To study this change, over 1000 women were interviewed about their living and working conditions and their physical and mental wellbeing using a capability framework. Questions were also asked about their sources of support, and in particular, who they could call up on for assistance and if they thought their quality of life had improved, and how did they expect the future to work out. The data was collected by interviewee collected questionnaires. The results were surprising in that, most reported an improved quality of life and looked forward to the future, despite arduous work, poor work conditions and very poor living conditions. Their support mechanism and networks evolved to rely on both institutional support and mainly workplace friends. The role of

relatives in their lives, especially “Ja-es” (sister-in-laws), who were the main influence on the lives of rural women as found in a previous research, has to some extent diminished. There is emerging evidence that as a consequence of this disruption, women are gaining more autonomy and are becoming more empowered. However, most remain in daily contact via mobile phones with their family and relatives and if big decisions are to be made these are still the prime source of reference, other than for job searching and work-place related problems. We conclude that by examining social change using SNA provides insights that hitherto have been unreported by those researching social change in the socio-technical sphere.

Age as a predictor for relationships within teacher teams

Kendra Geeraerts (University of Antwerp), Jan Vanhoof (University of Antwerp), Piet Van den Bossche (University of Antwerp), Nienke Moolenaar (Utrecht University)

The purpose of this study is to examine the extent to which teachers' work related social networks are affected by age related characteristics. Due to demographic changes, such as the high retirement rate of older employees and the growing trend of age diversity, intergenerational learning gains more attention. Intergenerational learning is mainly conceptualized as an interactive process between groups of people from different generations through which one or both parties learn. Intergenerational relationships and interactions therefore support intergenerational learning. Furthermore, intergenerational learning is a valuable process for competence building and knowledge retention between different generations of teachers. The three major generations currently in the workplace include Baby Boomers; Generation X; and Generation Y. While teachers are often unaware of the expertise and experience of their colleagues, also schools face difficulties in taking advantage of the expertise of all teachers within the school team. Social ties among actors in schools are essential since they provide access to social resources such as knowledge, information and expertise. Based on the concept of network homophily, we assume that teachers are more likely to interact with colleagues of the same generational cohort. Previous research suggested not to use a too narrow approach on age, therefore we also take into account the years of experience within the school. Survey data were collected among 352 teachers from 18 elementary schools in the Netherlands. Regarding the generational cohorts, 106 teachers were younger than 35 years old, 108 were between 35 and 50 years old and 138 teachers were older than 50. The survey contained social network questions on work related discussions, asking advice, providing advice, and collaboration. Using social network analysis, we first investigated if there are differences in normalized degree centrality between teachers of different generational cohorts. A one-way ANOVA was conducted on each network question. In addition, we analyzed the effect of teacher and school demographics on individual teachers' probability of having relationships in the networks, by using p2 modeling. Preliminary analysis of the data indicates that significant generational cohort differences regarding in-degree centrality were found for the networks of giving advice and collaboration. For these networks, teachers of the youngest cohort were found to have significantly higher scores than teachers of the middle cohort and teachers of the oldest cohort. This implies that young teachers receive advice from more colleagues than the other generational cohorts do. In addition, the youngest teachers collaborate with more different colleagues, as compared to the other generational cohorts. No significant differences were found between the middle cohort and oldest group of teachers in terms of in-degree centrality. Regarding out-degree centrality measures, significant differences between generational cohorts were found in the discussing work network. Teachers of the middle cohort were found to have significantly more colleagues with whom they discuss their work, than their older colleagues. Additionally, p2 modeling will provide more insight in how age related characteristics on the individual, dyadic and school level affect teachers' patterns of relationships within the different networks.

Enhancing community detection in multiplex networks leveraging its layers' aggregation

Raluca Gera (Naval Postgraduate School), Ryan Miller (Naval Postgraduate School), Akshati Saxena (Indian Institute of Technology Ropar)

We introduce a general purpose algorithm which includes enough community detection detail from each layer, yet is still flexible enough to be meaningful in a variety of networks. The aim of this research is to build on the current research conducted on layer aggregation methodologies as well as preexisting community detection algorithms. We apply our algorithm to Noordin Top's terrorist multiplex network. We validate our algorithm by measuring conductance and network community profiling.

Why all the negativity? An empirical analysis of the determinants of negative ties

Alexandra Gerbasi (Grenoble Business School), Eric Quintane (The University of Los Andes), Joe Labianca (University of Kentucky)

Negative ties in organizational networks are critical to understand individual level outcomes. However, we know little about the individual and situational factors that facilitate the emergence of negative ties between individuals in a workplace context. In this research, we investigate the impact of individual attributes, personality traits and organizational factors in the emergence of negative relationships among 46 individuals in a High Tech company. We use multivariate ERGMs to model positive and negative ties together. This enables us to understand both the interplay between positive and negative ties as well as the specific influencers of the emergence of each type of tie. Our results show that the social processes that lead to the emergence of negative ties differ from those that lead to the emergence of positive ties. We find a specific tendency towards popularity and gender based reciprocity in the negative tie network, while none of the propinquity or personality variables predict the emergence of negative ties. These findings help us develop a finer grained understanding of how and why negative ties emerge, in contrast to positive ties.

Social Networks, Adaptation, and Resilience in Mixed Cash-Subsistence Economies of Rural Alaska

Drew Gerkey (Oregon State University)

Throughout the Arctic, people utilize sources of monetary income and mobilize social relations to facilitate subsistence harvests, a pattern known as the mixed cash-subsistence economy. Despite repeated exposure to forces of social and environmental change, these mixed economies have sustained Arctic communities for centuries. As labor, cash, and food flow within and between households, networks of social support emerge that are crucial for people's livelihoods and cultural identities. Yet, market expansion, political integration, resource extraction, climate change, and migration are increasingly altering dynamics of mixed economies in the Arctic and threatening to undermine individual livelihoods and communities. Understanding how these forces affect networks of social support is essential for anticipating dynamics of exposure and vulnerability, as well as enhancing adaptation and resilience. Drawing on cross-sectional data of complete subsistence networks in 8 villages in rural Alaska, this presentation: (1) investigates how economic and demographic characteristics affect a household's position within subsistence networks, (2) identifies emergent patterns of social relations that extend beyond households to structure mixed economies, and (3) explores how these patterns may influence human dimensions of adaptation and resilience in response to social and environmental forces of change.

Partner-specific Behavior in Social Networks: Coordination among Actors with Heterogeneous Preferences.

Nikki van Gerwen (Utrecht University), Vincent Buskens (Utrecht University, Department of Sociology / ICS)

Conventions guide and structure our daily behavior. This study investigates experimentally decisions on conventions in networks. We focus on coordination games in which individuals can have conflicting interests. In contrast with many previous studies, we allow individuals to behave differently in interactions with different partners in the network. We investigate how partner-specific behavior influences coordination in networks when individuals have different preferences about conventions. Results show that being able to behave partner-specifically is sometimes disadvantageous for coordination and sometimes advantageous, depending on the heterogeneity in preferences in the network. Moreover, subjects seem unable to foresee when the ability to behave partner-specifically is disadvantageous for coordination, since they invest in the ability to behave partner-specifically even when this does not pay off.

Employee Cooperative Behaviors in Organizations: a Vignette Experiment

Nikki van Gerwen (Utrecht University), Vincent Buskens (Utrecht University), Tanja van der Lippe (Utrecht University)

Results of investments in training are to a large extent dependent on employees' willingness to behave cooperatively. In this paper, we argue that training will influence employees' willingness to behave cooperatively in two domains:

towards the employer and towards colleagues. We argue that training will decrease employees' turnover intentions and increase employees' helping intentions. Furthermore, employee differences in terms of skills and knowledge, the type of training provided, and the social cohesiveness of the organization are expected to play a role in their willingness to behave cooperatively. A vignette experiment was conducted in 2015 among 780 employees. Multilevel analyses show that employees are less inclined to leave the organization and more inclined to help colleagues after receiving training. Investments in training thus increase employees' intentions to behave cooperatively. General training tends to increase employees' helping behavior while simultaneously increasing employees' turnover intentions. Organizations seeking to increase employee cooperative behavior may want to consider investing in the amount of skills and knowledge of employees and the cohesiveness of the organization, as these characteristics have empirically been shown to increase employees' intentions to behave cooperatively.

Negative ties: An Integrative Framework of Antecedents and Consequences, Meta-analytic Investigation, and Agenda for the Future

Hamed Ghahremani (State University of New York at Buffalo), Prasad Balkundi (State University of New York at Buffalo)

Decades after the appearance of sociometric studies of positive and negative relationships in 1930s through 1950s that were inspired by the seminal work of Moreno and Jennings (1934) *Who Shall Survive?*, a second wave of scholarly research on negative ties has appeared in the literature since late 1990s. In this paper, we review these two bodies of research and summarize the findings in an integrative framework to show antecedents and consequences of negative ties. Our review recognizes important themes in research on negative ties and reports meta-analytic effect sizes of negative ties on outcomes at both individual and group levels of analysis. We conclude by proposing specific directions for future research on negative ties and social networks.

An Inductive Typology of Egocentric Networks

Eric Giannella (UC Berkeley), Claude Fischer (UC Berkeley)

We apply Random Forests to detailed survey data of social relations in order to derive an inductive typology of egocentric networks. Beginning with over 40 descriptors of 1,050 northern California respondents' networks, we combine twenty-one of these into seven dimensions, the extent to which those networks display: 1) social engagement with nonkin, 2) proximity to kin, 3) overall involvement with kin (including support), 4) support from nonkin, and the extent to which 5) church, 6) work and 7) extra-curricular activities shape connections with others. We use these dimensions to reliably place 985 of the 1050 observations into types: career-and-friends (24%), family-and-community (20%), family-only (16%), untethered (8%), energetic (7%), withdrawn (6%), and home-and-church (5%). In the second part of the analysis, we describe the social and demographic attributes of respondents that predict membership in each cluster to present a richer picture of the network typology, as well as to confirm that the types have face validity.

Relational Dynamics between Emergency Management Organizations during a Terrorism Event

C. Ben Gibson (University of California, Irvine), Carter T. Butts (University of California, Irvine)

Public officials often issue warning messages in response to imminent hazard events in order to inform the public of the hazard and direct their behavior. Research on these messages have drawn from bodies of work regarding emergent collective behavior and norms, and information diffusion. Though research in this domain has focused upon a largely one-sided communication dynamic from the organizations to the public, the structure of information flow between these organizations are important, but not well-studied. Fortunately, the expanded focus of emergency management organizations to include online communication allows researchers a unique opportunity to observe their public communication dynamics in precise, real time. Here, we observe dynamic interactions on the social microblogging site Twitter during the Boston Marathon Bombing. Using relational event models, we find that dyadic exchange between public-facing organizations is common, despite what we might expect given a "pure" public-facing, unambiguous information deluge to the public. With the unexpectedness of the event in mind, we find that organizations may also embark in sense-making behavior among themselves, despite their stated purpose as primarily for the public.

Multi-graph based semantic knowledge detection

Giuseppe Giordano (University of Salerno)

Semantic Network may arise from different sources of knowledge, such as relational database, qualitative analysis, open sentences in a questionnaire, and so on. A graph representation of concepts, linked by semantic relationships can represent an ontology. In its simpler form, a semantic network calls for a set of node-lemma linked by co-occurrence in an event-set (documents, authors, movies, etc.). In more complex situations there exist different types of nodes (nodes with different attributes, e.g. authors, papers, places in a co-authorship network) or different types of relationships (also linked in a hierarchy, e.g. co-occurrence in a scientific paper, which is part of a scholar's full publication, which is part of a research center, etc.) These last can give rise to multi-graph and/or multi-layer network approach to the analysis of a common language or more generally to detect regular patterns in semantic knowledge. In this context, we present a social network analysis framework to treat open-ended sentences deriving from a questionnaire. Text mining pre-processing and semantic tables will be used to produce multi-graph semantic networks. An application to Italian public school self-evaluation process will be presented.

This is #FreddieGray: Networks of Community Response to Injustice and Policing

Kimberly Glasgow (JHU/APL)

In April 2015, a young African-American man was arrested by Baltimore City police. One week later, he died of spinal cord injuries sustained while in custody. The event triggered a series of protests in Baltimore, and later acts of violence, rioting, looting, and arson. Throughout, Baltimore residents used social media to share information, images, and opinions, and to influence perceptions or organize responses to these events, or engage with civil authorities. In addition to its local impacts, the death of Freddie Gray garnered national attention as emblematic of broader issues of social, economic, and racial justice.

This work is an exploratory examination of the networks of Twitter users who engaged in discourse relating to Freddie Gray, justice, and policing. It characterizes the nature and development of these networks, examines their geographic aspects, and considers whether social media activity on justice issues reshapes the networks of participants.

Who does Academic Inequality Hurt More? An Examination of Academic Placement by Professorial Rank, Gender, and Discipline

Neha Gondal (Boston University)

Academia has been described as a highly durable system of inequality where faculty career prospects are deeply circumscribed by the prestige of the department where they received their doctoral degree. Research unequivocally shows that, across time and discipline, graduates of top-ranked departments are overrepresented at every rung of the ranking ladder. Upward mobility - the ability of graduates of comparatively lower-ranked schools to obtain jobs at higher-ranked schools - is nearly nonexistent, in contrast. Research also shows that rather than diminishing with seniority, initial advantage accumulates over time exacerbating inequality and widening the gap between those who obtained their degrees in top departments and others who did not. Moreover, research does not support the hypothesis that job hierarchy is reflective of differences in candidate quality.

This 'indelible marking' and subsequent snowballing of advantage associated with the prestige of one's doctoral degree has aptly been described by Val Burris as the academic caste system. Despite what we know about the hierarchical nature of academia, however, some crucial questions remain unanswered. My foremost puzzle is, "for whom is academia more of a caste system?" In particular, I examine if the effect of academic prestige hierarchies varies by professorial rank and gender. I conduct this analysis for four distinct disciplines - sociology, history, computer science, and business. Despite the growing body of research investigating academic inequality, we know surprisingly little about whether it varies by professorial rank. The little evidence we have is somewhat dated and suggests that seniority should alleviate academic inequality. Gender has received more attention but the evidence is mixed. Yet, we have little systematic research examining the interaction between gender and rank.

Rather than using the typical individualistic strategy that uses faculty characteristics (e.g. age, number of publications) to explain success on the job market, I employ a network approach that conceptualizes jobs as an exchange network

where graduate students are traded between doctoral programs. This approach acknowledges that candidates' employment opportunities are not independent, but rather, contingent upon the existing structure of exchange between institutions. However, unlike previous research using a network analytic lens that typically provides a descriptive analysis, I offer a statistically rigorous one. I use a cutting edge statistical technique in the analysis of social networks - exponential random graph modeling (ERGM) to analyze the exchange of academics across four disciplines.

Variability in market inequality by professorial rank and gender would be evident if department ranks were successful at explaining the hiring patterns of some groups and performed poorly for others. This would imply that some groups are more bound to the prestige of the doctoral degree than others. Currently, there are two major sources providing academic department ranks - the National research Council (NRC) and U.S. News (USN). With few exceptions, we know little about the comparative explanatory power of these three ranking criteria. This is especially important given the controversy surrounding the NRC rankings. I compare the success of all three criteria by professorial rank and gender for computer science, history, and sociology.

Sexual networks and racial disparities in HIV among men who have sex with men in Atlanta: a dynamic network modeling study

Steven Goodreau (University of Washington), Samuel Jenness (Emory University), Eli Rosenberg (Emory University), Patrick Sullivan (Emory University)

Men who have sex with men (MSM) represent most new HIV diagnoses and infections in the United States, and the US HIV epidemic is characterized by marked Black/White disparities in HIV prevalence and incidence. Numerous explanations for the disproportionate impact among Black MSM have been offered, and thoroughly reviewed. These include distal factors such as stigma and institutionalized racism; however, the full set of proximate pathways has proven challenging to identify with certainty. Reports of individual risk behaviors such as number of sex partners and condom use do not explain higher burden in Black MSM. Differences in sexual network structures, as well as in the HIV care continuum by race, have been proposed as likely important drivers of disparity. Dynamic network models are uniquely well positioned to evaluate multiple proposed mechanisms for their ability to generate or sustain disparities, and have been called for repeatedly in the literature. We implemented such a model, parameterized by data from young MSM in Atlanta, Georgia to explore several of the most commonly hypothesized factors that might lead to disparities, alone and in combination: assortative mixing by race; other differences in sexual behaviors and sexual network structures, including the momentary degree of main and casual partners by race, the distributions of one-time partners, patterns of age mixing, and relational durations; differences in the HIV care continuum; and differences in the CCR5 Δ 32 mutation that provides resistance to HIV infection. We find that the care continuum and the CCR5 Δ 32 mutation, combined with assortative mixing by race, can explain a large portion of the disparity. However, this is offset by most of the network-related parameters, for which White men report structures that favor transmission more than Black men. Exceptions include relational duration and status disclosure. Our models generally match observed HIV prevalence for White MSM, but yield an epidemic that is too small for Black MSM; as a result, we also considered forms of misclassification for network parameters for Black men resulting from disproportionate desirability bias and stigma; this yielded Black prevalence estimates that matched observed values. We end with a discussion of implications and of future network analyses and models to be conducted.

Automotive International Trade Networks: A comparative analysis over the last two decades

Sara Gorgoni (University of Greenwich), Alessia Amighini (Università del Piemonte Orientale)

This paper explores the structural changes in the international organisation of automotive production since the early 1990s. We apply descriptive network measures to international trade data over 1993-2013 for three automotive component groups with different technological intensity, with the aim to understand: 1) How the automotive international trade network changed since the beginning of the 1990s 2) To what extent the rise of new countries as important suppliers to the world's leading car producers contributed to change the network structure and 3) Whether the organisation of production in this industry has become more or less globalised. As the automotive sector is one of the more fragmented industries worldwide, with production processes split across a vast number of countries, in order to understand how production is organised internationally it is necessary to investigate components production and trade. In order to identify changes over time and compare across components, we use visualisation tools and some descriptive measures commonly used in Social Network Analysis (SNA). These include network size and composition,

different type of centralities, core-periphery analysis, E-I index and brokerage roles. We use disaggregated trade data at 5 digits level, representing detailed product categories for each of the components used in automobile production, using the Standard International Trade Classification (SITC, Rev. 3). As production fragmentation is largely driven by technological factors, different types of auto parts are likely to differ in the way production is organized across countries due to diverse technological content and value-to-weight ratios. Therefore, we aggregate the commodity groups into 3 components groups with different technological content: electrical and electric parts, engines and rubber and metal parts. For each of these 3 groups we take the bilateral trade flows in 1993, 2003 and 2013 as reference years to map the changes in the international structure of automotive production occurred since the beginning of the 1990s. The trade value for each reference year is an average over three years. We measure bilateral flows for each component groups as the share on total world trade because we are interested in the relative position of each country in the network and its changes over time. Nine squared directed valued matrixes have been created and analysed where the nodes represent the countries and the ties represent the trade flows among them. We believe our analysis helps improving our understanding of the phenomenon of globalisation in a number of ways. Our results show that the rise of emerging economies such as China as global suppliers has contributed to the restructuring of the international organisation of automotive production, but contrary to common belief, international organisation of auto production has become more regionalised, and we provide some possible explanations for this.

The Role of Showbusiness Families in Movie Industry: A Network Perspective

Yasaman Gorji (John Molson School of Business)

The movie industry has experienced a number of transitions. Following antitrust action, in 1948 major studios, which had integrated value chain across all the process of movie making, were obliged to divest their theaters. Subsequently, due to fierce competition studios ended exclusive contracting with talents (Balio 1985, Jones 1996) that heavily impacted the reduction of in-house human resource management of studios thus diluting their prominence. Ergo, rather than traditional hierarchies in major studios, the industry forged toward a network form of socio-economic relations. Since 1980s, the industry has primarily relied on short-term, project based relationship, where broader network and diversified ties breeds more opportunities and less redundant information (Granovetter, 1973; Burt, 1992). In this temporary network-based context, where mutual trust and reputations have been cemented over time (Jones 2002, Ferriani et al. 2005) and where quality and creativity of newcomers are hard to assess, family ties can be signals of quality. It has long been argued that family business use their social networks as a means of accessing information about new business opportunities (Birley, 1986; Greve & Salaff, 2003). However, due to the difficulties in collecting data on network structures of private family businesses empirical support for the hypothesis is sparse or anecdotal. This study attempts to trace and scrutinize the impact of family kinship network on the performance individuals in the movie industry. Family and nonfamily participant involvement in the new business venture are well documented in the movie credits. We believe, similar to organizational studies neglecting the networks in which individuals are embedded can lead to an incomplete understanding of their behavior and performance. Our study would contribute to the literature by covering both family and professional networks that would provide a comprehensive overview of the industry from network perspective and facilitate tracking, comparing the performance of individuals who benefit from their dynasty and those who lack this privilege. The multigenerational show business families are ubiquitous in the industry. The empirical context for this study is the US movie production industry. With the recent advancement in network analyzing software, there has been a surge towards the study of network-based industries and Hollywood hasn't been an exception (Perry-Smith and Shalley 2003; Burt 2004; Perry-Smith 2006). The movie industry is in essence an ideal laboratory to quantify and examine the characteristics of network strategies since each movie can be considered a new business venture (Cattani & Ferriani, 2008) and data on each movie is copiously documented in international Movie Database (A.K.A IMDB) and is vastly used by scholars. The movie industry database provides appropriate to investigate the extent to which families follow altruistic/nepotistic network strategies which favor their kin to the detriment of their financial performance (Schulze et al, 2003). Other scholars reason that families are particularly interested in pursuing nonfinancial goals, such as building their reputation in their referent community (Zelweger et al, 2013; Berrone et al, 2010). Film critic data (meta-critic, rotten tomatoes) provide rich data regarding reputational performance.

Ossalabs: Maximizing Social Media Value

Ricky Grannis-Vu (Stanford University Online High School), Rick Grannis (UCLA Sociology)

The Ossalabs analytic tool discovers and explores emergent patterns in networked social media conversations. Treating the data as dynamic, valued, directed, multirelational, and multimodal, Ossalabs guides users in using various network analytic routines to better understand the dynamic conversations occurring across social media platforms and then translates these results into user-friendly visualizations and lay interpretations. In the 2014 election cycle, two gubernatorial campaigns, Hogan in Maryland and Snyder in Michigan, used OssaLabs to assist their successful campaigns. The Snyder campaign used OssaLabs to analyze social media coverage, to preempt potential crises, and to drive engagement with voters. The Hogan campaign, which had already cultivated a formidable social media presence, used Ossalabs to track the topics and issues that mattered most to voters. Serving the Snyder campaign, Ossalabs analyzed social media to rapidly gauge attitudes on issues faster than any polling could, providing critical intelligence to time-sensitive situations. Ossalabs furthermore allowed the campaign to distinguish high volume stories in several useful ways, partisan from non-partisan, organic conversations vs. re-posted news coverage. Finally, Ossalabs detected sharp increases in various discussions and correctly predicted attacks by rival campaigns in advance providing valuable time to prepare. Serving the Hogan campaign, Ossalabs identified effective and ineffective social media messaging strategies. Ossalabs also allowed the campaign to know when to respond to opponent attacks and when to stay on message. Lastly, Ossalabs allowed the Hogan campaign to intelligently navigate the media spin machine that followed each debate. Using Ossalabs, these campaigns maximized their social media value and efficiently dealt with potential scandals.

Venues: Finding the Political in the Apolitical

Christopher Graziul (University of Chicago)

Political scientists often view political networks as social networks whose ties (or structure) contain political content. This endogenous definition makes it difficult to study the independent influence of social networks on political outcomes. I introduce an analytic framework for overcoming this difficulty. Through the lens of social context, I hypothesize that, under certain conditions, the episodic formation of weak ties while carrying out routine activities (i.e. purchasing food, fuel, or medicine) cultivates tolerant political attitudes among community members. I test this hypothesis by considering its effect on electoral behavior in the United States, where I expect this phenomenon to penalize presidential candidates that appeal to group threat (e.g. terrorism, illegal immigration, and gay marriage as urgent political issues). Using data from the past four presidential elections and a multilevel modeling framework, I find support for my hypothesis that the apolitical social settings available to voters can affect their aggregate electoral behavior. My findings demonstrate the utility of widening our definition of political networks, as well as the analytic leverage provided by more precisely characterizing the effect of social context on network structure (and content).

Relationship Characteristics Associated with Sexualized Bullying Homophily: A Social Relations Model Perspective

Harold Green (RAND Corporation), Marc Punkay (RAND Corporation), Brett Ewing (RAND Corporation), Josh Embree (UCLA), Dorothy Espelage (UIUC), Joan Tucker (RAND Corporation)

In this study, we sought to understand the role that homophily and social network features play in sexualized bullying similarity among friends. Specifically, we examined how similarities in individual characteristics, background, and personality between pairs of friends and social network indices like reciprocity and in-degree were associated with the level of similarity in homophobic name calling and verbal teen dating violence in friendship dyads. A Social Relations Model (SRM) was employed, as it focuses specifically on dyads while accounting for dependencies present in the overall social network in which dyads are embedded.

We used data from a longitudinal study of adolescent risk behaviors in three Illinois high schools. We focused on data collected from the first two periods that these students were in high school (waves 6 and 7 of the study). At each wave, friendships were recorded by having respondents name up to 8 friends. Homophobic teasing and verbal teen dating violence were measured by self-report on the Homophobic Content Agent Target Scale and the Conflict in Adolescent Dating Relationships Inventory. We created dyad-level homophily measures for a number of variables. These indicate a match between sender and receiver of the friendship tie in the case of ordinal and categorical variables, and indicate absolute difference between sender and receiver for continuous variables. SRMs were applied at each wave to determine the extent to which, controlling for individual sender and receiver characteristics, dyad-level homophily in demographics, upbringing, and personality and network structure and composition were related to dyad-level homophily in homophobic teasing and verbal teen dating violence.

For Wave 6, we find that homophobic bullying perpetration homophily is related to the popularity of the dyad members, as well as similarities in gender, receipt of social support, sibling aggression, delinquency, depression, past month marijuana use and ideas about traditional masculinity. Verbal teen dating violence is related to similarities in sexual orientation, past month marijuana use, and ideas about traditional masculinity. For Wave 7—which is comprised of older students—we find that homophobic bullying perpetration homophily is related not to the popularity of the dyad members but to the number of friends they share and, to a lesser degree, whether their friendship is reciprocal. Homophobic bullying is also related to similarities in gender, grade, level of sibling aggression, delinquency, and similarity in level of fighting. Verbal teen dating violence is related to differences in popularity between the dyad members as well as to similarities in gender, grade, primary caregiver, depression, impulsivity, and frequency of pornography viewing. We compare and contrast these two behaviors and the two waves of data analyzed and discuss how these findings refine our understanding of these two behaviors and provide insight for intervention.

Multi-level Challenges in Climate Change Policy Networks: Evidence from Indonesia

Monica Di Gregorio (University of Leeds), Dodik Nurrochmat (Bogor Agricultural University), Intan Sari (Center for International Forestry Research), Sonya Kusuma Dewi (Center for International Forestry Research)

This paper investigates the structure, the opportunities for and the barriers to cross-level integration of policy networks in two subdomains of climate change policy - climate change mitigation and adaptation - in the land use sector in Indonesia. There are numerous challenges to cross-level networking in the climate change policy domain, including problems of institutional interplay, differences in policy and political priorities, differences in perceptions of costs and benefits from mitigation and adaptation actions, and barriers to communication and collaboration across scales including uneven knowledge, capacity and resources to sustain cross-level interactions (Young 2002, Adger 2005, Klein 2005, Hooghe and Marks 2002). In practice we know very little about the challenges and solutions to cross-level interactions in environmental policy networks, such as the role that institutions, policy coalitions and cross-level brokers can play (Ernstson 2010, Keskitalo et al. 2014, Young 2002). This paper draws on social network analysis on natural resource management (Gallemore et al. 2014, Ingold and Fischer 2014, Prell et al. 2010, Crona and Bodin 2010) to investigate mitigation and adaptation policy networks across three governance levels in the land use sector in Indonesia. It aims to answer the following questions: 1. To what extent are climate change policy networks in the land use sector able to effectively link different governance levels in Indonesia's? Does vertical integration differ in the mitigation and adaptation sub-domains, and why? 2. What is the role of institutions, of policy coalitions and of individual brokers in facilitating or hampering cross-level policy network integration? To address the first question we examine the multi-level structure of climate change policy networks (communication and collaboration networks on climate change mitigation and adaptation) across three governance levels in Indonesia and undertake a homophily analysis across these levels comparing mitigation and adaptation networks. To answer the second question, we first identify cross-level brokers and assess the role and political motivations of different policy actors (domestic vs international, state vs non-state actors) in facilitating or hampering interactions across levels (Gould and Fernandez 1989, Bellotti 2009, Bizzi 2013). We then identify policy coalitions through a cluster analysis and assess the role of climate change beliefs in coalition building and in the ability of coalitions to bridge governance levels (Carrington et al. 2005, Krackhardt and Stern 1988, Krackhardt 2007, McPherson 2001). The paper contributes to advance approaches to investigate multi-level environmental policy networks, an underresearched area in social network analysis (Tramner et al 2014, Stein et al. 2011). It uses primary network and interview data from over 100 policy actors at national, provincial and district levels in Indonesia. The survey and interviews were undertaken between 2014 and 2015 and cover information exchange and collaboration ties and opinions on climate policy and actions related to both mitigation and adaptation strategies.

Estimating the proportion depressed among lesbian, gay, and bisexual older adults: Lessons learned from a respondent-driven sampling feasibility case study

Maryclare Griffin (University of Washington), Krista Gile (University of Massachusetts), Karen Fredriksen-Goldsen (University of Washington), Mark Handcock (University of California, Los Angeles), Elena Erosheva (University of Washington)

Lesbian, gay, and bisexual (LGB) older adults are one of the least understood groups in terms of their health and aging-related needs. There is considerable complexity involved in designing studies on health outcomes for LGB older adults due to the lack of available sampling frames. Members of this population are both relatively rare and can

be stigmatized. Respondent-driven sampling (RDS) is therefore a promising method for studying LGB older adults. However, there are concerns that social networks of LGB older adults may have unusual structures that could render RDS studies infeasible. Because RDS studies are costly to implement, it is important for researchers to be able to assess in advance whether an RDS study is warranted.

This talk illustrates an RDS feasibility analysis for estimating prevalence of depression among LGB older adults in selected metropolitan statistical areas of the United States. We employ a recently developed comprehensive simulation study framework for assessing RDS feasibility given sampled egocentric social network data. We use observational data on demographic characteristics, depression, social network structures and attitudes toward future study participation and peer recruitment of LGB older adults from the study Caring and Aging with Pride. We carry out data-matched simulation of population, network structure, and RDS chain-referral processes in order to systematically study the quality of RDS estimators for the proportion depressed. For regional population sizes, we use estimates of LGB adult population from the Gallup Daily tracking surveys. We assign nodal characteristics of gender and bisexuality as part of the simulation of networked population, and use a logistic regression model, estimated from CAP data, for nodal assignments of depression status. Our results allow us to comment on conditions under which RDS studies for obtaining point estimates of the proportion depressed are likely to be feasible, and to examine coverage of the respective RDS estimators. We discuss challenges in interpretation of these results and make recommendations for future collection of egocentric social network data for targeted RDS feasibility studies.

The Emergence of Negative Campaigning on Twitter: Evolution of a Signed Network During the 2016 GOP Nomination Contest

Justin Gross (UMass Amherst)

The unprecedented number of serious candidates in the Republican Party's 2016 nomination contest for the U.S. Presidency provides a rare opportunity to examine the changing nature of affective relationships among candidates. All seventeen major candidates have Twitter accounts and have tweeted comments about their opponents both before the campaigning began and over the course of the campaign for the GOP nomination. Political scientists, writing on the phenomenon of negative campaigning, have made a number predictions about what conditions will make it more likely that a campaign shall "go negative." These researchers have concentrated on advertisements, but the number and variety of advertisements produced are highly dependent on a campaign's resources. By contrast, candidate social media use allows us to directly observe, in real time, candidate interaction. Furthermore, the nature of "going negative" is more complicated in a crowded field and would seem to benefit from a network analytic approach. Structural balance theory, in particular, provides some guidance in thinking about the dynamics of positive and negative affect, operationalized as a signed network. However, peer group and organizational behavior, commonly driving theories of structural balance, are rather distinct from the behavior among electoral competitors. How likely is it that, in an environment tending toward mutual animosity, a taste for structural balance also emerges? I address this question, examine clustering patterns and describe some highlights of the online conflicts and collaborations that have played out in this unusual election season.

The Citation Impacts of Structural holes and Status in Patent Inventors' Networks: Three Taiwan Semiconductor Firms

Yi-Ren Guan (The Department of Sociology at the National Chengchi University), Ray-May Hsung (The Department of Sociology at the National Chengchi University)

In the past three decades, Taiwan semiconductor industry has been competitive in the global market, and the major reason is that there are a great number of patent inventions or innovation capability. Previous studies have shown that the status or centrality of inventors' networks and structural holes of inventors' networks are advantageous for innovations. This paper used the 2007-2014 patent data from (United States Patent and Trademark Office, USPTO) of three largest semiconductor firms, TSMC, UMC and Media Tek. Both positions of structural holes and status in the networks have been widely found as important factors to affect the innovations of individuals. These two factors were seldom combined together as types of mixed positions until recent article by Burt and Merluzzi (2013). This paper will examine how four types of mixed combinations by status and structural constraints in patent inventors' networks affect the patent citations of individual inventors. This paper used the 2007-2014 patent data from (United States Patent and Trademark Office, USPTO) of three largest semiconductor firms, TSMC, UMC and Media Tek.

We found individuals located in the positions of the hub type (lower structural constraint and higher status) in the networks produce the patents with more citations. The individuals located in the position of local brokers (lower structural constraint and lower status) create patents with more citations than those in the position of local status (higher structural constraint and higher status). The individuals in the position of relatively disadvantaged create the patents with the least citations.

Citing for existing: Building French Management Studies' autonomy by relying on US references (1965-1975)

Nicolas Guilhot (Université Jean-Moulin Lyon 3), Benoit Cret (Université Jean-Moulin Lyon 3)

In France, Management Studies ("sciences de gestion") is still a recent academic discipline. The creation of a dedicated section in the Consultative Committee of the Universities only dates back to 1969. It was directly inspired by the US Ford and Carnegie Foundations rationalizing reforms during the early 1960s' (Marco, 2006). Many French academics were sent there to complete their training (Pavis, 2003, 2010); such individuals represent one third of the successful candidates in the first three examinations for professorship in the newly created section (Chessel & Pavis, 2001). New academic journals supported this process in various ways (Pavis, 1998). This communication is part of a larger project dealing with the social history of the epistemological basements of management studies (Cret & Guilhot, 2015). It proposes a citation network analysis of the uses of US references between 1965 and 1975. The purpose of such a communication is to highlight the conflicting institutional struggles at the heart of the creation of the discipline. Our main hypothesis is that French academics used US references to gain personal and institutional legitimacy. Citing US references could have been a way to legitimate the new discipline by distinguishing it: a) from law studies, which were traditionally affiliated with economics and which excluded Anglo-Saxon references, and b) from economics, by focusing on more practical issues, thus promoting the Business Schools' educational programs aimed at the industrial sector.

Our methodological approach combines: a) a citation network analysis (bibliographic coupling by author and by journal) of the main French management reviews of the period, in order to identify groups of French academics using the same US references, b) a prosopography study of the career path of the main publishing authors in these reviews, in order to select variables to characterize their position (e.g. the year of the first scholar travel in United States - if any -, the primary discipline of the academic curriculum or the belonging to the industrial world), and c) a qualitative study of the way such authors have used references to US scholars in the texts themselves, focusing on the negational and persuasive citation types proposed by Bornmann and Hans-Dieter (2008). This proposal is a work-in-progress. The citation network is currently being built by indexing the references cited by the papers published during the five first years of three of the earliest French management journals (Pavis, 1998): "Direction et gestion des entreprises" from 1965 to 1970, the "Revue française de gestion" from 1975 to 1980, "Sciences de gestion" from 1979 to 1984. As none of these journals are indexed in online databases, we are using our own tool (Cret & Guilhot, 2015) to index the cited references in the published papers. Final results will be available a few weeks before the conference.

Understanding Social Network Size Variation among Nebraskans using the Network Scale-Up Method

Patrick Habecker (University of Nebraska-Lincoln), Bilal Khan (University of Nebraska-Lincoln), Kirk Dombrowski (University of Nebraska-Lincoln)

This paper investigates the distribution of social network size across a sample of 460 Nebraskans who participated in a survey in 2014. Social network size is estimated using the Network Scale-Up Method and the Mean of Sums estimator. The average social network size for the entire sample is 587. Degree of urbanicity, political identification, religion, and education are all associated with differences in social network size. No associations were seen between social network size and age, sex, or race. We find that participants in rural areas had significantly higher average network sizes than those in urban or semi-urban areas of Nebraska. Politically, participants who self-identified as conservative had larger networks than liberals, but neither were different from those who identified as politically middle-of-the-road. Participants who were Catholic, Protestant, or identified as "Other Christian" had similar sizes of social networks and tended to have larger networks than those who identified as "None" or followed a non-Christian religion. Education is also associated such that those with a graduate or professional degree had lower network sizes than any other education category. Associations between mean social network size and either political view or education level seem

to vary by level of urbanicity that a participant was located in. In urban areas (50,000 people or more) conservatives had far larger networks than either liberals or middle-of-the-road participants who were themselves very similar. In midrange areas (10,000-49,999 people) liberals had smaller networks than either conservatives or middle-of-the-road participants. However, in fully rural areas (less than 10,000 people) there were no differences in network size by political identification. When looking at education, in urban areas the lowest network sizes are among those who have a graduate/professional degree and those who have less than or just a high school diploma. In midrange areas only graduate/professional degree is associated with lower social networks and in rural areas there are no differences in network size by education attainment. Understanding how social network size varies by location and individual attributes informs both the general field of social network analysis and those interested in developing network interventions. The extent to which a representative sample of Nebraskans may be informative of the larger US is questionable, however, the findings presented here likely extend to a large portion of the Midwest and Great Plains regions.

Inferring networks of diffusion using Classic Maya ritual inscriptions

Habiba Habiba (University of Konstanz), Jessica Munson (Department of Sociology/Anthropology, Lycoming College), Jonathan Scholnick (University of California, Davis), Viviana Amati (Department of Computer & Information Science, University of Konstanz)

Classic Maya hieroglyphic inscriptions contain documentary evidence of shared cultural traditions and past social relations between royal individuals. However, due to sparse records and indirect observations of past interactions, archaeologists are challenged to precisely identify the diffusion mechanisms responsible for the spread of cultural information in the distant past. Classic Maya hieroglyphic monuments that are precisely dated and have secure archaeological provenience offer a unique data set to infer the underlying structure of network interactions among Classic Maya rulers. These carved stone monuments record the names, dates, ritual events, and dynastic history of ancient Maya rulers as well as their relationship status with political rivals, subordinate officials, diplomats, and kin. Here, we propose to infer paths of diffusion and influence by applying a number of data driven approaches which use the observed temporal traces of various rituals recorded on monuments at disparate ancient Maya sites dated to the Classic period (ca. 250-900 CE). We apply probabilistic models and inference algorithms that make minimal assumptions about the physical or cognitive mechanisms responsible for diffusion.

Field Formation in Intellectual Networks: the Emergence of the Life Sciences in Germany, 1770-1890

Jacob Habinek (University of California, Berkeley)

How do sciences come to be organized into disciplines? Much of the sociological literature treats discipline formation as resulting from either the rational reconstruction of university curricula or the successful professionalization of a new intellectual community. In contrast, in this talk I conceive of scientific disciplines as dynamic and mutable “coalitions of the mind” composed of scientists sharing a common interest in mobilizing support from patrons, lay audiences, and other scientists. Successful disciplinary projects, I argue, must not only organize their own members, but also intercalate themselves into the activities of universities and other disciplines. Using a unique longitudinal data set of German life science institutes and their recruitment networks, I analyze the success and failure of some two dozen disciplinary projects in the life sciences from 1770, well before the onset of widespread discipline-building, to 1890, by which time disciplinary boundaries in the life sciences were largely settled. I find that state efforts to rationalize the organization of higher education altered academic recruitment networks, but did not lead directly to the emergence of new disciplines. Instead, new disciplines thrived when they were incorporated into concrete networks of recruitment between universities and symbolic networks of recognition among disciplines. The results carry implications for organizational theory, cultural sociology, and the sociology of science.

Ethnoracial Status and Tie Decay in Social Networks: Linking Triracial Hierarchy and Simmelian Tie Theory

David Hachen (University of Notre Dame), Omar Lizardo (University of Notre Dame), Michael Penta (University of Notre Dame), Matthew Chandler (University of Notre Dame), Brandon Sepulvado (University of Notre Dame)

There has been surprisingly little theoretical integration between lines of macro-structural theory developed outside of the social network tradition and the dyadic level processes of interest to micro-structural network researchers. In this paper we integrate recent theoretical work on the macro-organization of racial hierarchy with network theories of the micro-level determinants of tie-decay. Applying this analytic strategy to a data set composed of unobtrusively monitored social interactions among adolescents making the transition to college in an elite university context, we model tie-decay as a function of the ethnoracial composition of a tie. Using event history analysis methods, we find that the tie dissolution rates for Asian/White and Black/Latino pairs are slower and thus indistinguishable from the rates for the assortative ties (excepting the all Latino pair which has the lowest dissolution rate). In contrast, the dissolution rates for Asian/Black and Asian/Latino pairs are high and similar to the high rates for White/Black and White/Latino pairs, indicating the existence of an interactional boundary with similar potency levels for these cases of ethnoracial mixing. However, we also find that these effects are largely mediated by the greater likelihood of some cross-racial pairings (and some intra-racial pairings) to be “Simmelian ties,” ties that are not free standing dyads but are embedded in higher-order structures. These results indicate that while ethnoracial disassortative ties are formed, heterogeneous patterns of tie-decay among disassortative pairings generates a social network that is broadly consistent (with some exceptions) with macro-structural theorizing pointing to the emergence of a “triracial” hierarchy in the United States. We discuss the implications of our results for future work integrating macro-structural theorizing from outside the network tradition proper to make sense of dynamic mechanisms of tie maintenance and decay.

Intersections and Separations in Gender and Race-Focused Social Media Movements

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In social movements like #BlackLivesMatter and #YesAllWomen, people use social media platforms to coordinate, communicate, and collaboratively further social justice goals. Social media sites enable spreading of information and awareness during social movements, both about in-person events and to share information more broadly. However, the reach of a social movement depends on information spreading to people who are not already part of that movement. We present an analysis of Twitter activity during the trending of 17 prominent gender and race-focused social media movements in 2014 to understand overlaps among and separations between these related social media movements. We calculated three different measures of overlap between movements: hashtags from different movements co-occurring in a tweet, hashtags from different movements co-occurring in different tweets by a user, and interactions between users prominent in different movements. We then examined correlations between these overlap measures and textual linguistic differences between movements, as well as qualitatively-determined characteristics of pairs of movements, including solidarity, use by people with intersectional identities, and conflict. We hypothesize that, after controlling for differences in time and movement size, pairs of movements exhibiting more solidarity, intersectionality, and conflict will have more overlap; preliminary findings support this hypothesis. By understanding intersections and separations, we can better enable information spreading and awareness between social media movements.

Gender Role-Based Deference in Multiplex Ties between Korean Business Groups

Jungyun Han (National Taiwan University)

Deference within a dyad occurs as one partner acknowledges that the other is entitled to certain privileges. Although most research examines how deference relationships work within a single type of a tie, e.g. a buyer-supplier relationship (Castellucci and Ertug, 2010) or a relationship between suppliers (Podolny, 1993), yet it is not known whether deference could also spill across different types of ties. This can happen within multiplex relationships, defined as ties in which actors share multiple bases for interaction (Kuwabara, Luo, & Sheldon, 2010; Verbrugge, 1979; Wasserman & Faust, 1994). This can happen within multiplex relationships, especially when they involve firms that have both business interactions between their key decision makers, as well as their personal interactions. Two actors may be equal partners in a business transaction, but deference in a personal relationship may manifest itself in deferential behavior in a business transaction. For example, caste differences in India represent unequal status that can affect information transfer between individuals that has consequences for business decisions that they make on behalf of their business group (Chen et al, 2015). We combine insights from status and institutional theories to examine how actors' behaviors in a business dimension of a multiplex relationship are shaped by the culturally-induced deference norms in a personal dimension of the same relationship. Empirically, we examine market entry and exit behavior of Korean business groups, connected by marriage relationship between their owner families. Such marriage relationships represent multiplex ties that comprise both personal and business dimensions. The business dimension stems from the

emergence of a direct channel for information exchange between trusted partners (i.e., owner families), which among other things involves the exchange of insights about advantages and disadvantages of chaebols' strategic positions in individual markets. The personal dimension involves the formation of the kinship relationship between the business owners' families that involves "husband" and "wife" roles of different family members. The husband/wife interactions are deeply embedded within the Confucian cultural tradition, which clearly spells out the roles and expectations about the appropriate behaviors for spouses and their families. We show that gender and family roles in a marriage tie, as prescribed by the Confucian tradition, will affect business decisions of the chaebols in terms of entries to or exits from common markets. Specifically, we propose that it will be the business group of the husband that takes advantage of this information and actively reconfigures its strategic position through entries to or exits from the common markets. We contribute to research on multiplexity by showing how deference from a personal relationship can affect behaviors in what otherwise should be a business relationship between equals. Relatedly, this study contributes to the literature on status by suggesting that institutional norms can be a potent source of deference within a firm dyad that existing research tends to overlook. We also contribute to research on competitive positioning by focusing on overlooked social explanation that could cause organizations to reconfigure their market positions even when this helps one organization at the expense of another.

How Internet of Things changed online-community

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In the internet of things age, the concept and factors of community is changing based on the community development with new technologies. As our lives are based on digital devices and objects which are interconnected with others, it is possible to the access to the micro level and framework-focused communities with human interaction for short and long time period and engaging with other people. Such communities will give more elaborate life experience and personalities in our lives. For example, using smart devices for tour is engaging daily experience based on personal establishment and social interactions. Internet of things make people to be more social and active in the life. In this study, authors analyze what is the giant change of online-community in the internet of things age. For the data collection, authors chose topic and categories of communities (food and travel such as Yelp and Tripadvisor) and survey is conducted with online-community users about their real experience changes in online-community. Semantic network analysis is accomplished by all of words from survey using WORDij, UCINET and LIWC. Results indicate that what is the implication and changes with the advent of new technology Internet of Things in the online-community based on users' behavior and perception.

The crowd-sourced graph: Uncovering the social innovation landscape in Austin, Texas

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Social innovation has become a mainstream topic for policymakers and investors across the country, from the Social Innovation Fund launched by the White House to the impact investment projects initiated by companies such as JP Morgan Chase. At a city level, the capital of Texas has transformed into an epicenter of social innovation, with a local accelerator having a record of over 200 self-identified social enterprises in Austin. Despite its recent growth, Austin's landscape of social innovation remains opaque, lacking transparency in flows of money and influence. The aim of this research project is to uncover the social innovation landscape in Austin through a network-based approach, utilizing a crowd-sourced map. We will release a spreadsheet, populated with 500 agents collected by UnLtd USA, to the public through local social innovation intermediaries. The data input from the Austin community will be tracked, cleaned and flow into another public resource: a network map, hosted on browser-based network visualization interface kumu.io. The map will display entrepreneurs, ventures and investors as the nodes, along with investments, employment, and board membership as the defining relationships. We hypothesize that creating a publicly available network visualization tool, analyzed through social network analysis, will have myriad benefits for diverse stakeholders. Primarily, through a public-facing platform we will increase the transparency of the social innovation ecosystem in Austin. Additionally, we hope to illustrate where expansion efforts should be focused to reduce replication and increase efficiency. Lastly, we believe the tool can help connect entrepreneurs with the investors and resources they need to grow their businesses and maximize their social impact.

The Coevolution of Friendship, Companionship and Music Preference in Early Adolescence: A Social Network Study

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Peer affiliation plays a central and important role in adolescent development and is related with various behaviors. Peer affiliation is an umbrella term referring to various peer relationships in adolescents' life, and the literature has been defining and operationalizing significant peers in several ways (Lomi, Snijders, Steglich & Torlo, 2011; Rubin, Bukowski & Laursen, 2009). The present study will focus on the co-evolution of different types of peer affiliation. Especially, because in daily life adolescents spend time and affiliate with multiple and different types of peers simultaneously: weak (i.e., companions) as well as close (i.e. friends), and interaction-based (i.e., companions, friends) as well as cognition-based (shared preferences such as music taste). Focusing on the dynamics of these multiple and different types of peer affiliations in one research design is an essential first step and will yield deeper insights on these complex and existing affiliations which adolescents daily encounter and interact in.

Data stem from the SNARE (Social Network Analysis of Risk behavior in Early adolescence) project. The first- and second-year students of two Dutch secondary schools participated (2011-2012). One year later all new first year students participated. In total, 1786 students (M age time 1 = 12.91 years, SD = 0.70, 50.1% male, 83.9% Dutch). We selected for this study only the first year students (three measurement waves: t1 in October, t2 in December and t3 in April). Companionship and friendship can be seen as one-mode networks while shared music preference can be seen as two-mode networks. Friendship (best friend) and companionship (who you spend time or hang out with) were measured with peer nominations within their class and also within their grade. Music preference (favorite music) is assessed with self-reports; multiple choices were allowed. First, we analyzed the stability over time within each network and the overlap between networks. Subsequently, we analyzed the data from t1 -> t2, and t2 -> t3, using the default (evaluation) function with the statistical programme SIENA (Simulation Investigation for Empirical Network Analysis) (Snijders, Bunt & Steglich, 2010) within the software package R (R Development Core Team, 2008). The companionship and friendship networks were presented to RSiena as a multivariate network; the property that a friendship tie implies a companionship tie is respected in the simulation model, which means that the two networks are treated as an ordered network.

The following five hypotheses were tested in the present study. H1: Agreement on music preference will lead to a companionship tie H2: Agreement along companionship will lead to a friendship tie H3: Agreement on music preference will lead to a friendship tie H4: Agreement on companionship will lead to similar music preference H5: Agreement on friendship will lead to similar music preference In total, 10 models (five locations and two cohorts) and a meta-analysis were computed. The t-convergence ratio and goodness-of-fit (for indegree distribution, outdegree distribution, triad count, and geodesic distance distribution) were checked. In the presentation, the findings regarding these five hypotheses will be discussed and implications will be addressed.

Interviewer identity and learning effects as sources of variation in self-reported reported social networks

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Background: Self-reported social contact data are inherently subject to risks to reliability and validity due to respondent behavior: to reliability due to respondents interpreting name generator questions differently; and to validity due to underreporting appropriate alters, owing either to recall bias or to respondent efforts to minimize the burden of the questionnaire. Yet perhaps equally as important, although much less frequently discussed, is the extent to which interviewer behavior and characteristics present a source of bias. Interviewers vary in their understanding and representation of the survey questions to the respondent - potentially affecting reliability. In addition, interviewers may consciously or unconsciously seek to minimize survey burden for themselves or respondents by favoring language or probes that reduce the number of contacts elicited. Over the study period, interviewers may learn how to guide the interview to minimize the number of questions asked and thus the time taken.

Methods: We analyzed the patterns of alter reporting in a recently completed survey conducted in South Africa. Between November 2014 and November 2015 the Health & Aging in Africa: Longitudinal Studies of INDEPTH

Communities (HAALSI) study interviewed a random sample of adults aged 40 and older living within the 27 communities of the Agincourt Health and Demographic Surveillance System site in rural South Africa. Egocentric social network information was sought via a single name generator asking for up to "...6 adults with whom you have been in communication...in the past 6 months, starting with the person most important to you for any reason." Unnamed spouses were added to the list. Name interpreters included alter, ego-alter and alter-alter tie questions. We evaluated how elicited alter numbers changed across interviewers and across the survey period.

Results: Twenty-nine interviewers questioned 5086 respondents, eliciting a mean of 3.1 alters. The mean number of alters across interviewers varied from 1.4 to 6.1. The mean number of reported alters fell almost linearly from November 2014 (mean 4.7) to September 2015 (mean 1.7), as did the modal number, from 7 in November 2014 to 2 by May 2015. After an interviewer refresher training, alter numbers rose sharply in October 2015 (mean 3.2). In a Poisson regression model including respondent age and sex and the interaction of interview month and interviewer identity, 21 of 29 interviewers had a statistically significant fall in mean elicited alters across the study period; on average, interviewers saw an 8% monthly decline in mean alters elicited up to September 2015.

Discussion: Interviewers appear to have significantly impacted reporting of social contacts in this study, generating non-comparable results across respondents and limiting the usefulness of the data for egocentric analyses. The rebound in elicited alters following refresher training suggests declining response rates were not a function of increasingly hard-to-find and isolated respondents. Research using interviewer-led name generator surveys should monitor for interviewer learning effects across the data collection period, providing intermittent retraining exercises as needed. Alternatively, interviewer discretion could be limited by requiring a fixed number of named alters from all respondents, or utilizing self-interview techniques.

Price and Position Amongst Friends and Enemies: Preferential attachment and hierarchy in positive and negative ties.

Nicholas Harrigan (Singapore Management University), Janice Yap (Singapore Management University), Bing Yang Tan (Singapore Management University)

It has long been known that affect (friendship) displays hierarchy but not preferential attachment. Friendship shows a preference towards those of higher status, but the need for introductions, access, and a fair chance of reciprocity means that friendship tends to be directed towards those within a short social distance. For similar reasons, friendship does not display preferential attachment: friendship ties requires continual investment to maintain them, and such investment imposes a cost on actors with limited resources. However, do the same dynamics apply to negative ties? We use longitudinal stochastic actor oriented models (RSiena) to model the evolution of negative and positive ties in a network of 115 students over a period of 1 year. We find that the positive friendship network shows evidence of the conventional wisdom: hierarchy exists and the mechanism is local: transitive triads tend to close. Similarly, friendship shows evidence of costs and a sharp limit on preferential attachment: the number of actors at distance two reduces the likelihood of receiving new friendship ties. In contrast we find that negative ties display hierarchy in a very different way: hierarchy is manifest as a tendency towards preferential attachment: the square root of the indegree is significantly positively correlated with new ties. There is no evidence of transitive closure within negative tie networks. This suggests that hierarchy in negative tie networks is based on a considerably more global social influence than that displayed by friendship: judgements about negative ties are formed at a distance, influenced by the opinions of acquaintances, and sent without the desire for reciprocity.

Avoidance in Negative Ties: Inhibiting closure, reciprocity, and homophily.

Nicholas Harrigan (Singapore Management University), Janice Yap (Singapore Management University)

Theorising of negative ties has focused on simplex negative tie networks or multiplex signed tie networks. We examine the fundamental differences between positive and negative tie networks, measured on the same set of actors. We test six mechanisms of tie formation on face-to-face positive (affect/esteem) and negative (dislike/disesteem) networks of 282 university students. While popularity, activity, and entrainment are present in both networks, closure, reciprocity, and homophily are largely absent from negative tie networks. We argue this arises because avoidance is inherent to negative sentiments: avoidance reduces information transfer through negative ties and short-circuits cumulative causality for non-conflictual attributes.

Climate Change Alters Social Structure of Mating Systems Among Rural African Pastoralists

Ashley Hazel (Stanford University), James Holland Jones (Stanford University)

The Himba, a semi-nomadic, agro-pastoralist population in northwestern Namibia, like most African pastoralists, live in arid landscapes that are vulnerable to drought. To sustain livestock herds under these conditions, pastoralists employ a variety of strategies to adapt to periods of extreme weather, including transhumance movement, dispersal, supplemental subsistence (e.g. small-scale cultivation), or seasonal labor migration. Mobility determines sexual partner access and influences cultural norms about relationship dynamics, fertility, and family structure. Concurrent sexual partnerships are central to the high-mobility lifestyle of the Himba. For example, it gives women freedom to choose sexual partners for emotional support or resource access, even after entering into arranged marriage. However, concurrency also results in high paternity uncertainty. To bypass proof of paternity and relieve familial tensions, the Himba use matrilineal descent for livestock inheritance.

As climate change increases the frequency and length of droughts in arid environments, strategies that used to be temporary adaptations for optimizing resource access during annual dry seasons or unforeseen droughts could become permanent solutions for life in an altered climate, in turn affecting fertility, parental investment, and lineage persistence. In our ongoing fieldwork in Namibia, we have observed early signs of behavioral change in response to a 15-year drought among the Himba. Herein, we employ stochastic dynamic programming to evaluate optimal mobility strategies for different objective functions relating to economic returns, fertility, and long-term lineage persistence under regimes of ecological volatility. Models are parameterized using data collected from ongoing work among Himba. We predict that, as non-herding strategies become optimal for an increasing proportion of the population, overall mobility will decrease. Furthermore, for most women, concurrency will decrease, but will increase for a minority of unmarried women. We expect that the resulting increased paternity certainty may shift inheritance from the matriline to the patriline, potentially limiting women's ability to use sexual networks as channels for increasing resource flexibility and increasing vigilance over women's reproductive behavior.

Pluralism and elitism in the global corporate elite: a big data network analysis approach

Eelke Heemskerk (University of Amsterdam)

The classic debate in power studies between elitists and pluralists has now re-emerged at the global level. Do we see a relatively cohesive transnational (capitalist) power elite' or are there in fact factions with irreconcilable differences among this transnational elite? This controversy is in part the result of theoretical and methodological nationalism because 'transnational' is always defined in relation to the 'national'. However, it may very well be that global corporate elite networks reside partly within and partly between nation-states, but yet are global in character. This leads to the question of the relevance of national borders for the global network of corporate governance. This paper answers this question through an analysis of the global corporate elite network of interlocking directorates among the largest 1 million firms worldwide. First we investigate to what extent cohesive subgroups within the global corporate elite co-align with national borders. Second we determine how network structures are particular to different regions across the globe, without assuming that nation-states form a relevant level of analysis. This delivers key empirical insights on the extent to which the global corporate elite forms a cohesive group, or rather consists of competing elites

Layers of social intergration: Contact opportunity and the dynamics of inter-ethnic friendships and adolescents' perceived integration

Robert Hellpap (Nuffield College, University of Oxford), Isabel Raabe (Nuffield College, University of Oxford), Jan O. Jonsson (Nuffield College, University of Oxford)

We ask how ethnic school composition is related to the dynamics of pupils' inter-ethnic friendship networks and their perceived host country integration. Hereby, we focus on pupils from ethnic minorities to investigate the role of their friendship network for their own feeling of belonging to the respective country. Two potential influence factors of perceived integration are distinguished. First, a pupils' own feeling of belonging can be influenced by the attitude of their friends. Second, realized friendship ties with majority classmates (direct outgroup contact e.g. Pettigrew & Tropp 2008) can lead to stronger identification for non-native pupils. On the other hand, pupils might also select which friends to make or keep based on their own and the respective others' feeling of perceived integration.

However, these individual level dynamics must be mitigated by the opportunity structure of the ethnic composition at the classroom level. The chance for inter-ethnic friendships will be based on the ethnic segregation on the school level and pupils' preference to befriend others (McPherson et al. 2001). Schools might also show a tendency to be segregated based on perceived integration. Our goal is to separate these aspects of social integration, by carefully investigating our data and applying stochastic actor-oriented models (SAOM) to analyze the selection and influence processes in the classrooms of the CILS4EU (Kalter et al. 2013) project (Children of Immigrants Longitudinal Survey in four European countries: NL,SW,GER,UK; 2010/2011). It contains information from pupil, teacher and parent questionnaires for around 20,000 children from 400 schools in two waves.

Translational Research in Medicine: A Multi-modal Approach to Inter- and Transdisciplinary?

Irina Hellsten (VU University Amsterdam), Loet Leydesdorff (University of Amsterdam)

The discussion on trans-, inter, and multi-disciplinarity has been booming during recent years (Klein,2008; Wagner et al.,2011). In medicine, the translation of scientific research results from basic and clinical research into new medicine and applications in clinical practice has led to the emergence of the new research field of Translational Research (Kerammaris et al.,2008; Woolf,2008).

Translational research (TR) aims at facilitating the application of laboratory results through medicine testing in humans (Marincola,2003) and has been conceptualized as a continuum of applied medicine from basic research (scientific publications) to clinical trials (resulting in patents and publications) to the adoption of new medicines and tools in practice. Has a new field of research emerged and if so, in which dimensions? How integrated is TR thematically? Can TR be considered as an interdisciplinary specialty or is it better described as a multi-disciplinary community of practice? The science-policy impulse (e.g., by the NIH) has been at the institutional level; but has this resulted in the emergence of an intellectual agenda? (Studer/Chubin,1980)

We focus on 'translational research' in medicine, and propose a multi-modal network approach to investigate the field. In particular, we focus on academic publications in thirteen journals with 'translational research' in their titles during 2012-2014. A multi-modal approach enables us to study this evolution at different levels both separately and in terms of relations among the levels. We distinguish the following levels: 1. institutional co-authorship relations and co-citation; 2. evolving semantics in terms of co-occurrences of words used in titles of publications; 3. co-evolving Medical Subject Headings (MeSH classifications) and journal-journal citation patterns as indicators of intellectual organization. Our design is innovative: The heterogeneous indicators are attributed as variables to documents (as cases) in a single document/attributes matrix (two-mode asymmetrical). This matrix can be transformed into a one-mode co-occurrence matrix so that the different dimensions can be compared in one vector space (both statically and over time). We additionally normalize using the cosine among the vectors in the document/attribute matrix so that the different measurement scales are taken into account.

By comparing among years, a shift from integration at the institutional level to the intellectual one can be indicated quantitatively; and perhaps differently for various medical specialties (e.g., oncology, cardiology). Did oncology take the lead in TR? Or is the field still decentralized and multi-disciplinary? Klein(2008) makes a distinction between US-based transdisciplinarity and European, problem-centered transdisciplinarity. Can this hypothesis be substantiated by the measurement in the case of TR?

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The Story Behind the Network Graph: a Mixed-Method Study on Problem-Centered Interviews about the Impact of Social Relations on Career Paths

Marina Hennig (Johannes Gutenberg Universität Mainz), Cathleen Stützer (Johannes Gutenberg Universität Mainz)

As part of a current research project we are examining the impact of social relations on career paths. In the past it was considered that social networks or embeddedness act as a catalyst for scientific careers. However, there are no studies that have examined the effects of networking on career paths. Hence this project focuses on the determinants for and, in particular, the effect of networking on scientific careers. The study is based on problem-centered interview data relating to ten professors (male and female) from different disciplines (social science and natural science) working at different universities in Germany which were collected in 2015. To facilitate the examination of their interactions during the different phases of the qualification process and the resulting networks, the interviews focus retrospectively on the professors' immediate environment during these phases. To determine the ego-centered networks we developed a method for collecting social relations for different qualification phases and the associated relational and interaction histories in narrative interviews. This gave us indications as to which kinds of relations were helpful in which contexts (family, friends, working relations, scientific community, institutional relations). The initial results show that information- exchange-, advice-, care- and conflict- relations are mostly supportive. The stories about these relations provide information on the ways in which they are helpful. To illustrate the procedure we draw the network graph for the narrative interviews and provide some examples of the stories behind this graph.

Heterogeneity in peer selection effects of physical activity in youth

Teague Henry (University of North Carolina at Chapel Hill), Sabina Gesell (Wake Forest Baptist Medical Center), Edward Ip (Wake Forest Baptist Medical Center)

Physical activity in children and adolescents has impacts on an individual's position in their social network. This peer selection effect of physical activity is heterogeneous in that it could potentially differ both within a specific network overtime and between separate networks. The focus of this study is to investigate these differences in the peer selection effect of children's physical activity. Differences in peer selection effects between and within networks have implications for network intervention design. Prior to implementing a network intervention in the field, it is important to understand potential within and between network differences in the effects that activity level have on network structure, as differences in the peer selection effect could render a network intervention less effective. In this study, the associations between activity level and cross sectional network structure, and activity level and change in network structure are assessed. In this study we examined two real-world friendship networks among 35 and 46 children (average age 7.96 years) who lived in low SES neighborhoods, attended public schools, and attended one of two structured aftercare programs, of which one was established and had existed for several years, and the other was new. We used the exponential random graph model (ERGM) and its longitudinal extension (STERGM) to evaluate the association between activity level and various demographic factors in having, forming, and dissolving friendship, while controlling for transitivity effects. Due to potential difference in the peer selection effects both between and within the aftercare programs, separate analyses were conducted for each network. Differences existed in the effect of physical activity on both cross sectional network structure and the formation and dissolution processes, both across within and between networks. Physical activity had different patterns of selection effects for each of the aftercare programs. Specifically, similarity in physical activity predicted friendship formation in only the new program (log-odds adjustment -5.859, $p < .05$), while general level of physical activity predicted friendship formation and dissolution only in the established network (log-odds adjustment 2.626, 5.163, $p < .05$, $p < .05$ for formation and dissolution respectively). Additionally, these effects differed over the time course in each network. Due to differences in the peer selection effect of physical activity between networks and within networks, a general network intervention could be rendered ineffective by different social dynamics. Network analysis can be used to assess the unique structure and dynamics of a social network before an intervention is implemented, so as to optimize the effects of the network intervention for increasing childhood physical activity. Future research into peer selection effects of physical activity should account for differences both between networks, and within a changing network. Special attention should be paid to understanding networks that are in a state of transition vs stable networks.

Multi-scale policy networks for regional water resources governance

Jacob Hileman (University of California, Davis), Mark Lubell (University of California, Davis)

The acceleration of changes in global water resource systems is exacerbating the ability of governance institutions to adapt, particularly in developing world regions. This paper highlights one of the key challenges to resilience in

resource governance - coordinating governance processes within and across multiple interacting scales - and applies a network-based approach to investigate structures of multi-scale water governance institutions. Using descriptive statistics and exponential random graph models, we test hypotheses of multi-scale network structure and function in an empirical water governance system (n=624) in Central America. We find that network structures vary across each scale in ways consistent with the primary functions and objectives of governance at different scales; closed structures facilitate cooperation and are present at the local scale, while open structures facilitate social learning and resource distribution and are present at the regional scale. Furthermore, we find that cross-scale ties impart small-world structures upon the multi-scale network. The balance of local clustering and global connectivity that defines small-world networks provides joint benefits on cooperation, social learning, and resource distribution, all of which are necessary for effective water resources governance.

Segregation in Social Networks: A Novel Approach Using Facebook

Bas Hofstra (Utrecht University), Rense Corten (Utrecht University), Frank van Tubergen (Utrecht University), Nicole Ellison (University of Michigan)

Social media have seen a remarkable rise to prominence in the last decade and they are increasingly used for the maintenance of interpersonal relationships. These online networks could supposedly be used to mitigate the social segregation that is usually found in offline friendship networks. On social media, individuals are not restricted to exclusively befriending others only from the schools they attend(ed), from neighborhoods in which they live or those met at offline activities. In contrast to these popular beliefs about social media, research findings suggest that online networks might be highly segregated as well. On social network sites, people mainly befriend others they have first met in offline settings.

This overlap between social networks online and offline opens up new opportunities for research: it allows to study (a large portion of) large personal networks. Networks displayed on social media such as Facebook are snapshots of a subset of one's complete set of social relationships, both strong ties and weaker ties. Whereas previous literature on offline networks has strongly focused on strong ties, little is known about segregation of the entire network, including weaker ties, such as with colleagues, neighbors and acquaintances.

Theoretically, weak ties have been argued to be more diverse than strong ties. Empirically, however, little is known about whether weaker ties are indeed more diverse than core networks. The study of social networks online provides new opportunities for examining the segregation of large personal networks, including both strong and weaker ties. An important asset as compared to earlier used survey methods is that online networks map networking behavior up to hundreds of friends, which are not restricted to specific contexts and are less prone to recall bias and other misperceptions.

We describe patterns of ethnic and gender segregation in Facebook networks of adolescents, as prior work has shown that the strong tie networks of adolescents offline are highly segregated in terms of ethnicity and gender. Second, we directly compare the segregation found in strong tie (offline) networks of adolescents to the degree of segregation in their large personal (online) networks. We use a large and general survey on the offline networks of Dutch adolescents and, uniquely, link these data with respondents' observed Facebook networks. We use machine-learning methods to enrich our Facebook data with additional information.

We find that core networks offline and weak tie networks online are highly similar regarding their ethnic segregation scores. The overlap between gender segregation online and offline is far less pronounced. Furthermore, ethnic segregation on Facebook is higher than gender segregation on Facebook. This was expected, since social settings (which are important for friendship formation) are more difficult to segregate by gender than by ethnicity. Therefore, we further unravel the role of opportunity structures for segregation of weak ties on Facebook. First, social contexts (e.g., school compositions) shape networks online. Second, those who have more friends have lower segregation scores. Finally, those who cannot be selective (i.e., non-natives) in friendship choices have lower ethnic segregation scores when the number of friends increases.

The Anatomy of Public Health Collaboratives: An Analysis of 500+ PARTNER Networks

Rachel Hogg (University of Kentucky)

Background: While the computational sciences have made great strides in collecting data that represent whole networks owing to the ability to mine electronic data records, the social and behavioral sciences currently lag. The recent development of the Program to Analyze, Record, and Track Networks to Enhance Relationships (PARTNER) tool has resulted in an unprecedented whole network dataset on interorganizational networks. PARTNER (www.partnertool.net) is an online social network data collection and analysis tool designed to measure and monitor collaboration among actors and organizations. The use of this tool is designed for use by interorganizational networks to demonstrate how members are connected, how resources are leveraged and exchanged, the levels of trust and perceived value, and to link outcomes to the process of collaboration. This tool has been used by over 700 interorganizational networks which has resulted in a dataset of whole networks, collected using consistent methodology and core questions. Over 80% of these networks have a public health focus, giving us an opportunity to describe the “anatomy” of the public health system and correlate that with network tendencies. **Context:** One of the most promising practice-based approaches in public health is the development of interorganizational networks as a way to attain resources, share knowledge, implement programs, develop policy, and, in turn, improve population health outcomes. Partnerships among community agencies, public and private institutions and concerned citizens have formed around many public health issues. These partnerships are “created by an understanding that the antecedents of poor health are multi-factorial and thus require a multi-systemic approach”. These collaboratives form social networks that involve diverse types of partners, varying levels of interaction, and multiple configurations.

Sample. In this study, we use a subset of the PARTNER dataset?—specifically we identify public health networks. With IRB approval, data are extracted, cleaned, and analyzed to represent a set of interorganizational networks based on a set of common criteria: 1) mission focused on public health policy (for example, oral health, early childhood intervention, and general community health), 2) organizations as the unit of analysis, 3) use of the same or similar PARTNER survey questions and response options, and 4) state and/or local public health department(s) membership in each collaborative. We also only select networks that contain more than 5 nodes and have a minimum response rate of 50%. The resulting dataset contains a total of approximately 500 whole network collaboratives, 3200 organizations; and over 90,000 dyadic ties. Drawing from a common question set, each network uses the PARTNER survey, with minimal modifications, to collect the data. The dataset contains 9 attribute variables for every organization, 8 network/relational variables, and 15 transformed variables.

Analysis: In this paper, we use this large N dataset to describe the boundary spanning characteristics of the public health “system”, describing organizational affiliations, linking those to dyadic partner tendencies, and correlating those to variation in network characteristics.

Results: We identify the most common types of organizations in public health networks and identify how those organizational differences result in variations in network tendencies.

Network changes over the life-course: mechanisms and driving forces

Betina Hollstein (University of Bremen)

Personal social relationships, as in families, friendships, and to neighbors, are of crucial significance to social integration and can serve many important cognitive, emotional, and practical functions. They help to guide and motivate, they convey a sense of belonging, afford relaxation and opportunities to socialize. In addition, social capital is a significant factor in reproducing social inequality. Furthermore, informal relationships also provide tangible support (e.g. care), hence significantly contributing to social welfare. However, informal relationships have been subject to change, both historically and at the level of the individual. The composition of the “convoy” of people (Kahn/Antonucci 1980) escorting the individual through life has been changing as well as the functions performed by these relationships. The question is, what do these changes in informal relations and networks depend on? Employing a Simmelian approach which enables an accounting of structural features of social relationships as well as of the actors’ individual orientations and the interplay of these factors I will investigate mechanisms and driving forces of network changes over the life-course. In order to do so I will draw on mixed-methods studies where we investigated network changes in several stages of the life-course: during the transition from school to work, during family formation and after the loss of the spouse.

A Semantic and Social Network Analysis of Nam June Paik in Cyberspace

Yoo Jung Hong (Sungkyunkwan University), Jung Ah Shin (Sungkyunkwan University), Jang Hyun Kim (Sungkyunkwan University)

Nam June Paik was a Korean American artist who founded the genre of “video art.” His works inspired numerous people who wanted to mix up diverse media for expressing their own thought and feelings. His works utilized cutting edge electronic media technology to show changing meaning of existence in the era of electronic media. Paik suggested “electronic super highway” term to indicated the image of future through electronic media and global networks. This paper tracks people’s response on Paik himself, and his works in social media space. It is hard to define his artistic position, but this study would provide how himself and his works are “socially constructed” within the realm of social media space. As rare studies have examined an artist’s perceived being in cyberspace, this study would contribute to the relevant disciplines.

SPIDER: New Technology for Constructing Sociometric Networks from Personal Network Data

Christopher Hopkins (Charles River Analytics), April Young (University of Kentucky)

During the past two decades, there has been a surge in the number of studies applying social network analysis (SNA) to the study of infectious disease transmission. The mapping of “risk potential networks,” in which individuals are connected by ties that spread infection, has yielded valuable insight into the behavioral epidemiology of human immunodeficiency virus (HIV) and sexually transmitted infections (STI). However, despite these advances and the burgeoning popularity of SNA-based HIV and STI research, methodological challenges remain. SNA’s ability to catalyze major epidemiologic advances relies on researchers’ ability to construct valid representations of participant networks from behavioral data. The standard protocol to construct risk networks, or identify direct and indirect relationships among participants and their partners, involves matching participants’ names and demographic information with the information provided about named partners. This process of identifying and resolving duplicate individuals in the network (known as “entity resolution” (ER)) is often conducted through laborious and time-intensive, manual cross-referencing procedures. In this talk, we will discuss and demonstrate SPIDER, a software package that automatically processes networks of participants and resolves duplicates using both participant characteristics and participant relationships within the network. SPIDER includes a secure server that allows for fine-grained access to research data and high-powered processing of very large networks, and a rich desktop client that allows the research to select and configure a wide range of entity resolution algorithms, reviews the results of entity resolution, and save and share the configuration with other researchers for consistent network design. SPIDER is tailored to the specific needs of HIV/STI researchers (but applies to other domains as well) and will provide them with a system that enables efficient, semi-automated risk network construction using a library of robust, statistically rigorous ER algorithms, rich desktop-based annotation tools, and secure web-based technologies. SPIDER assists researchers in constructing HIV/STI risk networks from data collected on sexual and drug-related partnerships, with the goal of improving methodological quality, comprehensiveness, and standardization.

Socio-Semantic Analysis of Online Discussions on Public Transit Service

Moein Hosseini (University of Toronto), Tamer El-Diraby (University of Toronto)

Bidirectional communication introduced by online social media serves as a new source of information in the field of transportation engineering. Different studies focused on various aspects of transportation including incident detection and traffic flow conditions in the field of road monitoring and traffic control, major service disruptions in the area of public transit, and public involvement in transportation planning and policy, to name but a few. In addition to identifying the challenges within the public transit organizations for utilizing online social media, most studies explored the semantic and sentiment of online user-generated contents without considering the social network shaped behind online discussions. Ignoring the social network and the communities hinders informed decision-making. This study not only bridges the gap in the literature between the content analysis and the network analysis but also performs a more specific semantic clustering using lexical resources. The semantic clustering classifies online contents using a lexicon developed based on customer satisfaction measures. Customer satisfaction is a key factor in the services provided by government organizations. The bi-directionality nature of conversation in online social media helps transit agencies improve the image of the agency, enhance the relationship between the agency and customers, clearly identify the service deficits, and address community concerns. Among all different available online social media sites, Twitter is

chosen as the data source because there is a growing trend among transit agencies in the use of this web-based tool. Furthermore, Twitter is mostly used to provide real-time information about the operation of the transit services which is a highly influential element in the level of customer satisfaction. Case studies of Canadian public transportation agencies owning active Twitter accounts are examined including Toronto Transit Commission (TTC) [operating in Toronto], GOTransit [operating in the Greater Toronto Area (GTA)], and TransLink [operating in Vancouver]. Two types of request are sent to the API. The first type, containing keywords related to each transit agency, is sent to the streaming API, and the responses are collected over a 12-month period. The second type of request takes a snapshot of the followers of each agency. The networks formed around the official Twitter accounts of transit agencies and their respective communities are analyzed via social network analysis measures. Different approaches for dividing the entire networks into multiple communities are discussed and compared. The conversations concerning customer satisfaction are studied within the entire networks and their communities. Finally, the labeled tweets are mapped to the relevant communities in order to perform a socio-semantic analysis. The results show an interconnection between the influential and active nodes of the network, semantic of the discussion, and the attribute of the organizations.

Friends in low places: Dynamics of tie formation following financial restatements

Michael Howard (Texas A&M University), Michael Withers (Texas A&M University), Laura Jones (Texas A&M University)

Organizational research has examined how board of director ties among large, established firms result in the creation and persistence of a corporate elite in the U.S. economy (Mills, 1956; Palmer, Friedland, and Singh, 1986; Davis, Yoo, and Baker, 2003). While the network of ties among such powerful elites helps perpetuate their privileged position in the economy, it also offers an important platform for the diffusion of information and new managerial practices between their firms (Davis, 1991; Haunschild, 1994; Haunschild and Beckman, 1998; Mizruchi, 1996), as well as ensuring access to critical resources and organizational legitimacy (Beckman, Haunschild and Phillips, 2004; Borgatti and Foster, 2003; Certo, 2003). Prior research has not yet focused on the impact of potentially stigmatizing events on the ability of firms to build much-needed interlock ties with external organizations. In our study, we examine the impact of financial restatements as events that could lead to significant stigmatization or loss of organizational reputation. A financial restatement represents a potential breakdown in governance oversight (Fama, 1980). Firms undergoing restatement events may face a crisis of legitimacy, reducing the likelihood of attracting valuable external partners and exacerbating their need for access to resources, information, and legitimacy-boosting associations with non-stigmatized counterparts. We examine the evolution of the network of board interlock ties among Fortune 500 firms during the 2002-2008 period. We use SIENA, a program for the statistical analysis of dynamics of social network tie formation (Snijders, van de Bunt and Steglich, 2010). SIENA permits tests of statistical inference in longitudinal observations of tie formation, as well as accounting for changes in behavior and characteristics of network nodes (Snijders, Steglich, and Schweinberger, 2007). This allows us to capture the time-based effects of potentially stigmatizing financial restatement events on subsequent director interlocks. Furthermore, the SIENA framework allows us to examine stigmatized and non-stigmatized firms as a bipartite social network, allowing for potentially different social processes of tie formation within and between the two groups. Our results offer interesting new insights into the role of potentially stigmatizing events on network tie formation. We find that firms experiencing financial restatements are less likely to have their current directors receive invitations to join outside boards, and they are also more likely to avoid new ties with other restatement firms. This is consistent with prior work suggesting that restatement firms are likely to experience reputational penalties within director interlock networks (Kang, 2008). We also find that restatement firms tend to draw on reciprocal ties and ties with higher status external firms, perhaps seeking to repair their reputation by forming ties with “legitimate” others (Elsbach, 1994). They are also more likely to maintain existing interlocks when their ties are currently embedded in transitive network structures involving multiple external firms. Our work contributes to the understanding of the processes of organizational tie formation under conditions of stigma or loss of reputation.

Segregation, integration, or isolation: immigrants’ personal networks and social capital

Ying Chia Hsu (National Chiao Tung University), Chen-Chao Tao (National Chiao Tung University)

Immigration involves the reconstruction of personal network. Whether and how this reconstruction influence perceived ethnic social capital is still unknown. This study interviewed 50 Hakkas moving from Taiwan to Japan and recorded their five close friends in Tokyo through name generators. The results show that the pattern of personal network is

primarily segregation, and the size of close friends coming from Japan significant influences perceived ethnic social capital.

Toward Small World Networks: the Trend of Dynamic Networks of Interlocked Elites in Taiwan Semiconductor Industry

Ray-May Hsung (Department of Sociology, National Chengchi University, Taipei), Gi-Yi Lin (Department of Sociology, National Chengchi University, Taipei)

This paper has two purposes. The first purpose is to explore whether there is a trend toward the characteristics of small world dynamic networks for interlocked elites in Taiwan semiconductor industry. The second purpose is to use regression models to explain the effects of different types of important owner elites on two characteristics of small world networks: average shortest path length and average clustering coefficient. We used data of the interlocked elites from 2000 to 2014 in Taiwan Economic Journal (TEJ). The elites include board director and important owners of stock shares. We calculate the index Q small world index made by Uzzi and Spiro (2005). After 2002, the size of the largest components of firms and elites has increased dramatically. The average shortest path length decreased from around 5.0 in 2000 decreased to 3.8 in 2003 and keep the path length around 3.8 to 3.5. Similarly, the average clustering coefficient decreased from .82 in 2000 to .69 in 2002. The Q index rapidly increased from 15.5 in 2000 to 26.53 in 2002. The clustering coefficient in 2015 is .58 and the average shortest path length is 3.61, and the Q index is 52.70. Evidently, the development of social networks of interlocked elites has been toward into characteristics of small world networks. The Q index changed dramatically in 2002-2003 when the government deregulated the restriction to foreign investment. We further classify elites into six types: family owners, business group owners, foreign investors, local financial investors, government investors and others. Family owners have the least probability to be incorporated into the largest component. All the other types of owners are the major member of the largest component. Family owners have the longest average shortest path length and foreign owners have the shortest average shortest path length. Family owners have the highest average clustering coefficients and government owners have the lowest average clustering coefficients. The foreign investors seem to play important role in the development of interlocked networks toward small world networks.

Use of Network Analysis to Assess Collaboration Readiness among Researchers and Affiliated Practice Partners in the State and Community Tobacco Control Research Initiative

Grace Huang (Westat), Michael Steketee (Westat), Julie Bromberg (BLH), Keith MacAllum (Westat), Janet Okamoto (Mayo Clinic), Elizabeth Ginexi (National Cancer Institute)

Although significant progress has been made in reducing tobacco use in the United States, many challenges remain. Currently one in five adults are cigarette smokers and evidence suggests that progress in reducing smoking prevalence has slowed in recent years. The research-to-practice gap is one such challenge amid a changing landscape of tobacco products, technologies and media platforms. In response, the National Cancer Institute (NCI) funded the State and Community Tobacco Control (SCTC) Research Initiative, a 5-year program to support innovative research to develop strategies for translating and disseminating scientific findings, tools and products to community practitioners, policy makers and the general public. In this study, we examine the collaborative partnerships between the scientists and their affiliated practice partners to better understand how network characteristics and structures are associated with collaboration and scientific productivity. We also identify network factors that promote effective research-to-practice translation and dissemination. We used a mixed-methods approach by collecting two waves of collaboration and project affiliation network data through web-based surveys during the spring of 2013 and 2015. The network included scientists at eight funded SCTC sites ($n=71$) and their affiliated practice partners ($n=129$). Data on collaboration readiness, publication and presentation co-authorships and additional individual-level attributes such as academic degree, project role, affiliation type and past NIH-funding were collected. Qualitative interview data with 58 key informants are used to provide site-specific context to network findings. Descriptive network findings indicate a significant increase in network size, number of ties, average centrality and overall network centralization, and decrease in network density over time. Multivariate regression models indicate that betweenness centrality was by far the strongest predictor of collaboration readiness among scientists, as well as among partnerships with external partners. We will describe predictive network models to elucidate additional structural and contextual factors that influence the change in collaborative relationships over time. Findings suggest that the SCTC Initiative served to expand and foster scientific collaboration and dissemination activity. Specific individual, contextual and structural factors were

identified as critical drivers for scientific collaboration. After sharing study findings, we will discuss implications for future multi-institutional team science research initiatives, and applications for using network methods to further dissemination and implementation science in the area of tobacco control.

Predicting Box Office from the Screenplay: The Role of Network Text Analysis

Starling Hunter (Carnegie Mellon University), Susan Smith (American University of Sharjah)

Empirical studies of the determinants of box office revenues have mostly focused on post-production factors, i.e. ones known after the film has been completed and/or released. Relatively few studies have considered pre-production factors, i.e. ones known before a decision has been made to greenlight a film project. The current study directly addresses this gap in the literature. Specifically, we develop and test a relatively parsimonious, pre-production model to predict the opening weekend box office of 170 US-produced, English-language, feature films released in the years 2010 and 2011. Chief among the pre-production factors that we consider are those derived from the textual and content analysis of the screenplays of these films. The most important of these is determined through the application of network text analysis—a method for rendering a text as a map or network of interconnected concepts. As predicted, we find that the size of the main component of a screenplay's text network strongly predicts the completed film's opening weekend box office.

Changes in sexual network characteristics of young men who have sex with men over time

Gregory Phillips li (Northwestern University), Patrick Janulis (Northwestern University), Brian Mustanski (Northwestern University), Michelle Birkett (Northwestern University)

Young men who have sex with men (YMSM) are at greater risk for a number of negative health outcomes, including acquisition of HIV and other sexually transmitted infections (STIs). Prior research has shown that understanding the characteristics of YMSM's sexual networks may be key to explaining the disproportionate effect of HIV on this population. Additionally, the temporal dynamics of their sexual networks may assist with targeting microepidemics within certain subgroups.

Data for this study are from RADAR, a longitudinal cohort study of YMSM in Chicago that is collecting individual-, dyadic-, network-, and genetic-level data to understand the spread of HIV through this highly affected population. To date, over 500 individuals have completed a baseline survey and 206 have completed their first 6-month follow-up visit. This analysis will use data from the 206 YMSM who have complete network data for both baseline (T1) and follow-up (T2). Participants were asked to name all individuals with whom they had sex (oral, vaginal, or anal) in the past 6 months, and to identify which of their network members had sex with each other during the same time period.

Study participants reported a median sex network degree of 2 (range: 0 - 22) at T1 and 1.0 (range: 0 - 9) at T2. After constraining the sample to the 161 YMSM who reported at least one sex partner for at least one time point, we found a significant decrease in degree from T1 to T2 (Wilcoxon signed-rank test $S = -1141.5$; $p < 0.0001$). Nearly one-half (41.0%) maintained the same degree, 41.0% decreased their degree, and 18.0% increased their degree. Changes in degree between T1 and T2 did not differ by ego's race/ethnicity, age, or sexual orientation, even after controlling for initial network size. This is counterintuitive to prior research, which has shown greater network stability in older and White MSM.

Our presentation will present additional information on a larger sample of YMSM and will include alter-level characteristics and sexual behaviors (e.g., condomless anal sex) to determine not only changes in the size of sexual networks but also risk behaviors that may lead to HIV transmission within these networks.

Divide and Rule: A Network Assessment of the Italian Anti-Interlocking Law

Alessandro Iorio (Carnegie Mellon University), Juergen Pfeffer (Carnegie Mellon University)

On December 6, 2011, in an attempt to limit the power of the financial sector, the Italian government issued an anti-interlocking law preventing financial firms from sharing board members with one another. To evaluate the impact of the law, we collected longitudinal data on board interlocks among all the financial and non-financial firms listed in the Italian stock market from 1998 to 2015. In particular, we created a panel dataset comprised of 9,180

firm-year observations through which we compared changes in centrality measures for financial firms with changes in centrality measures for non-financial firms (which were not directly affected by the law) obtaining difference-in-differences estimates of the intervention. By using such approach, we were able to gauge policy effects net of historical downward trends, which could have otherwise inflated our results. We found strong evidence that the anti-interlocking law impaired the level of cohesiveness among the financial corporate elite. Interestingly, and contrary to organizational theories that see board interlocks as ways to coopt sources of environmental uncertainty, financial firms did not raise their connections with non-financial firms to react to the destabilizing intervention.

Corporate Elite Campaign Donations and Political Behavior: The Case of Proposed Labor Legislation

Anna Jacobs (Vanderbilt University)

This project examines how elite social networks influence political actors. Specifically, I test whether ties to corporate elites increase the degree to which legislators sponsor anti-labor legislation.

Toward this end, I combine unique data sources assessing campaign donations, bill proposals, and constituent characteristics for all state legislators holding office during the 2011-2012 legislative session (N=7,943).

My analyses suggest that legislators who receive more campaign donations from highly centralized corporations tend to propose more legislation that opposes organized labor interests and favors business interests. This general association is, however, moderated by the political climate of the state. The anti-labor influence of corporate elite donations is strongest in states that are currently favorable to organized labor.

Taken together, these findings suggest that corporations strategically allocate financial resources to pro-labor political environments. This paper is among the first to examine the relationship between corporate networks and political actors at the state level.

Friendship Suspended: Estimating the Effects of School Suspension on Change in Friendship Selection

Wade Jacobsen (Penn State University)

Informed by symbolic interactionism, labeling theories have spawned a large body of research in the social sciences about the influence of official sanctioning on secondary deviance. Rarely included in this literature, however, is an empirical test of the mediating effect of peer rejection and withdrawal from prosocial networks that is implied by labeling theorists. Social network analysis combined with panel data methods allow for the examination of the effects of official sanctioning on changes in friendship preferences of ego and each alter. Using seven waves of data on adolescent school-grade friendship networks in Pennsylvania and Iowa, I examine the effects of school suspension on (1) discontinuity in friendship selection and (2) change in the behavioral characteristics of friends, defined by either incoming or outgoing ties. Preliminary results suggest a large and significant effect of school suspension on the likelihood that a suspended student will no longer be nominated as a close friend by a peer who nominated her in the year prior to her suspension.

Changes in drug network characteristics and marijuana use among young men who have sex with men.

Patrick Janulis (Northwestern University), Gregory Phillips II (Northwestern University), Brian Mustanski (Northwestern University), Michelle Birkett (Northwestern University)

Young men who have sex with men (YMSM) experience elevated rates of drug use compared to their heterosexual peers. Yet, little is known about the social dynamics that may explain variation in drug use within this population. While social networks characteristics have been frequently studied to understand drug use behavior among adolescents and young adults, most research has restricted analysis to a small subset of network types such as "friendship" or "hangout" networks. However, the importance of network structure may extend beyond social ties to other relationship types. For example, the structure of drug use ties (i.e., which individuals use drugs together) may provide important information regarding the network context of drug use that could be associated with current or future drug use behavior.

This study used data from RADAR, a longitudinal cohort study of YMSM that collects ego-centric network information on participant's social, sexual, and drug use networks. The primary aim of the current study is to examine the association between changes in network characteristics and changes in marijuana use frequency. Furthermore, capture of multiplex networks in the RADAR interview also allows for direct comparison between social and drug use networks and drug use behavior. Participants were included in the current analysis if they completed a baseline and six-month follow-up interview and reported at least one drug partner during the sixth months prior to both interviews. A total of 122 participants were included in the analysis reporting on more than 1,200 alters. A latent difference score approach was used to model the association between changes in two network characteristics (i.e., size and transitivity) among two network types (i.e., social and drug use) and changes in marijuana use frequency.

Results indicated that an increase in drug network transitivity was positively associated ($\gamma = 0.47$, $p = 0.006$) with an increase in marijuana use frequency but changes in other network characteristics were not significantly associated with changes in marijuana use. Furthermore, baseline drug network transitivity ($\gamma = 0.39$, $p = 0.027$) and drug network degree ($\gamma = 3.41$, $p < 0.001$) were positively associated with marijuana use at baseline. These findings suggest that drug network characteristics are associated with drug use behavior even after controlling for social network characteristics. Accordingly, drug networks may provide important information regarding the network context of drug use behavior among YMSM, above and beyond the limited information typically examined in network studies of young people's drug use.

Multiplex Networks of Civic Organizations in Cape Town, South Africa

Lorien Jasny (University of Exeter), Henrik Ernstson (University of Cape Town), Mario Diani (University of Trento)

The urban environment of Cape Town is contested along various dimensions of race, class and geography and presents an important case study to (i) learn about collective action processes in newly developing democracies, and (ii) how legacies of apartheid shape the structuring of civic networks. Drawing on a structural and relational network approach, we interviewed 130 civic associations mobilizing on a range of issues, including conservation of animals and habitat, the promotion of urban agriculture, and access to housing, water and sanitation. Groups came from white affluent areas, to black informal settlements (slums). Here we use Exponential Random Graph Models to test the extent by which there is mixing across geographic locales, racial composition, and levels of radicalization in the network of 120 organizations. We compare findings across networks of multiple types of ties: sharing information, sharing resources, working together on events, and sharing membership.

A broader perspective on intergroup contact: extended positive and negative ties

Eva Jaspers (Department of Sociology, Utrecht University)

Using longitudinal network data from high schools in Germany, the Netherlands, Sweden and the U.K. ($N = 12,988$), we investigate to what extent ethnic diversity of your friend's friends and enemies affects friendship formation with cross-ethnic friends. Previously, research found that your friend's friendship with individuals with a different ethnic background positively influences outgroup attitudes. Our paper is the first to study negative extended contact as well. Combining complete network with ego-centered network data and employing multilevel modeling, separate for majority and minority students, we estimate the effects of direct and extended positive and negative contact on future inter-ethnic friendship formation. We find that the effects of negative contact are smaller compared to those of positive contact. However, for negative contact the negative effects of direct and extended experiences are equal in size, whereas for positive contact, direct effects are much larger. We tentatively conclude that negative interethnic contacts may be more discussed in friendship networks, and that salience of third party ethnicity is larger when the contact was negative.

Untying The Knots: How Simmelian Ties Guide The Evolution And Performance Of Multi-Partner Alliances

Sebastian Jayaraj (Rutgers Business School), Marya Doerfel (Rutgers University School of Communication and Information), Trefor Williams (Rutgers University School of Engineering)

Partnering through interorganizational networks has been a focus of management and sociological scholars for decades (c.f., Gulati & Gargiulo, 1999; Pfeffer & Salancik, 1979; Van de Ven, 1976) and has viewed dyads as the foundation

of such system-wide structures. Over time, however, interorganizational networks come to stabilize, building up structures that can seem resilient to even the most dramatic perturbations (Doerfel et al., 2013; Doerfel & Haseki, 2014; Hannan & Freeman, 1984; Schumpeter, 1934). One industry that is fairly stable with a few industrial giants leading the way is the civil engineering industry that supports statewide and national public transportation needs like bridges and highways. While a construction industry evokes networked forms of organizing as a way to complete complex civil engineering projects, a cursory look at the industry suggests that there are more than just dyadic partners, but entire groups of contractors and subcontractors doing the work. Through a competitive bidding process multiple teams compete against each other to win construction projects. We are interested in exploring how some team combinations of contractors-subcontractors outperform others and what role Simmelian ties play in the evolution of this collaborative-competitive ecosystem.

Interorganizational routines and relationships can provide valuable information, drive selection of new partners and determine competitive advantage (Zollo, et al 2002, Dyer & Singh, 1998). While prior research has examined dyadic alliances (Gulati, 2007) we extend our analysis to triads. Simmelian ties can be “super-strong and sticky,” constraining group behavior more so than dyadic ties (Krackhardt, 1998; 1999). Applying a triadic lens facilitates examining whether members of a triad are constrained in their behavior due to normative group pressure or benefit from selective access to novel information and resources.

We use a partial sample of 316 projects from a database of over 1000 construction projects of the California Department of Transportation to analyze the inter-organizational networks and dynamics between contractors and subcontractors. We explore these alliance-forming processes using a 2-mode network of contractors-subcontractors relationships. Our preliminary analyses reveal that -

1. Preferential attachments among certain members (repeated contractor-subcontractor ties across projects and a large number of influential triads) indicate the presence of cliques in the construction industry.
2. A small set of contractors (8%) who work with the same subcontractors on 3 or more projects (repeated ties) accounted for 57% of all winning projects implying that some contractor-subcontractor teams/cliques enjoy a competitive advantage over others.
3. Only 5% of the subcontractors on winning projects work together more than twice on a project indicating rivalry among subcontractors and fewer tendencies to form local cliques.

Ongoing work explores how influential triads impact new partner formation and whether it affects performance outcomes. Longitudinal network analyses of these construction teams will reveal the role of dyadic and Simmelian ties in the evolution of multi-partner alliances.

This study contributes novel insights on the evolution of inter-organizational relationships in competitive-collaborative environments by revealing the influence and dynamics of triadic ties. We conclude with implications regarding inter-organizational networks, multi-partner alliances, collaboration-competition ecosystems and strategic networks.

Structural measures of specialization in teams

Gahyun Jeon (Northwestern University), Leslie Dechurch (Georgia Institute of Technology), Noshir Contractor (Northwestern University)

Each group member’s knowledge combined with their shared understanding of who knows what constitute a group-level transactive memory system (TMS; Wegner, 1986, 1987). Over the last three decades, scholars have examined a number of TMS characteristics. These include complexity, accuracy, agreement (Moreland 1999), knowledge stock, knowledge specialization, consensus, and accuracy (Austin, 2003), memory differentiation, task coordination, and task credibility (Liang et al., 1995; Moreland, 1999; Moreland & Myaskovsky, 2000). There is widespread agreement that specialization of knowledge distribution in teams is an important characteristic of TMS and has important implications for the cooperative division of labor for cognitive processes (Wegner, 1987).

There have been a number of conceptual approaches to specialization. Some of the relevant constructs include differential information distribution (Stasser & Titus, 1985), role specialization (Kilduff, Angelmar, & Mehra, 2000), diversity of expertise (Rau, 2001), memory differentiation (Liang et al., 1995; Moreland & Myaskovsky, 2000), knowledge specialization (Austin, 2003, Lewis, 2003), and knowledge differentiation (Palazzolo, Serb, She, Su, &

Contractor, 2006). Under the various conceptualizations, specialization has been measured in different ways. One approach to measure specialization involves group members' self-reports about the level of specialization in the group (Kilduff et al., 2000; Lewis, 2003). This method assesses members' subjective perceptions about the general level of specialization and does not require asking team members about specific expertise. Another approach involves measuring objective specialization by asking each team member to identify an expert for different tasks and calculating each member's specialization score. For instance, Austin (2003) measured group task knowledge specialization by first computing a standard deviation score of how frequently each member was nominated as an expert on different tasks by other team members and averaging the member's scores to achieve the group specialization score. This measure adequately captures the level of specialization for each team member across tasks but does not distinguish if one member's expertise is different from another member's expertise.

The purpose of the current study is to define and measure specialization in teams in a manner that captures the presence of experts as well as the uniqueness of team members' expertise. Therefore, we define team specialization as the extent to which team members are the sole experts in a given area. We develop and compare four metrics of specialization in a team using a bipartite incidence network linking people with the expertise they are perceived to possess by other team members: (1) inter-item correlation, (2) Jaccard index, (3) Euclidean distance, and (4) t-statistic of specific structural signatures that capture specialization using exponential random graph model (ERGM). We compare the fidelity of these metrics with the conceptual underpinnings of specialization articulated in TMSs. By doing so, the present study contributes to the literature on TMS by providing novel metrics to assess specialization in teams.

Dynamic Co-evolutions of News Frames in International Peace Coverage: A Semantic Network Analysis

Ke Jiang (UC Davis), George Barnett (University of California)

This paper employs semantic network analysis to investigate the dynamic evolution and co-evolution of news frames embedded in news coverage of peace in the United States, Mainland China and Hong Kong using data from 1995 to 2014. Specifically, it analyzed the semantic networks of English-language news coverage of peace from The Associated Press (AP), Xinhua News Agency (XH), and South China Morning Post (SCMP). From 1995 to 2014, the news frames of peace in AP and XH reflected the war culture and harmony culture in the United States and China respectively. On one hand, the two cultural frames of peace in AP and XH were relatively stable for 20 years. On the other hand, there was a trend toward convergence of the use of war frames between AP and XH. Peace frames in SCMP reflected not only the hybrid frames that integrated the war frames and harmony frames in AP and XH, but also the unique frames focusing on democracy and independence. At the network level, the convergence of semantic networks of coverage of peace in AP and XH may leave more space for SCMP to develop a unique peace frame, and the divergence of semantic networks of coverage of peace in AP and XH may lead SCMP to develop strategies of balancing the frames employed by AP and XH, thus creating a hybrid peace frame. At the concept level, the co-evolutions of the use of concepts of peace in the news among AP, XH, and SCMP mainly happened among the concepts representing people, location and events, but not among cultural concepts.

Bayesian analysis for exponential random graph models using the adaptive exchange sampler

Ick Hoon Jin (University of Notre Dame), Ying Yuan (The University of Texas MD Anderson Cancer Center), Faming Liang (University of Florida)

Exponential random graph models have been widely used in social network analysis. However, these models are extremely difficult to handle from a statistical viewpoint, because of the existence of intractable normalizing constants. In this paper, we consider a Bayesian analysis for exponential random graph models using the adaptive exchange sampler, which solves the issue of intractable normalizing constants encountered in Markov chain Monte Carlo (MCMC) simulations. The adaptive exchange sampler can be viewed as a MCMC extension of the exchange algorithm, and it generates auxiliary networks via an importance sampling procedure from an auxiliary Markov chain running in parallel. The convergence of this algorithm is established under mild conditions. The adaptive exchange sampler is illustrated using a few social networks, including the Florentine business network, molecule synthetic network, and dolphins network. The results indicate that the adaptive exchange algorithm can produce more accurate estimates than approximate exchange algorithms, while maintaining the same computational efficiency.

An Influence Maximization Approach to Enhance or Degrade Networks by Analyzing Multiple Chess Games

Anthony Johnson (Network Science Center at West Point), Chane Jackson (United States Military Academy)

To combat terrorism abroad, the United States seeks ways to degrade terrorist networks while simultaneously strengthening its own support network. Studies of empirical longitudinal networks that change over time are necessary for developing methods to aid the U.S. in its counter-terrorism efforts. This presentation describes a general framework of influence maximization in terms of a social network to model the direct influence relationship among pieces in a chess match. The chess network is monitored over time as relationships evolve throughout the progression of a game. Using each player move as a segment of time, each decision by the perspective player is analyzed as a change to a physical network which has 32 nodes representing individual chess pieces located on an 8 by 8 square board. The undirected links to the individual nodes are determined by whether or not any two pieces influence the same physical location on the board. Solutions to the resulting influence maximization problem reveal strategies to identify key individuals which can serve as a basis for the U.S. to expand its support network. The framework both captures previous work in the area and yields many novel problem formulations. Demonstrations of the framework's applicability will be evaluated through insights gained on selected examples.

Newcomers' Network-based Resources after Organizational Entry

Markku Jokisaari (University of Turku)

There is increased knowledge about the importance of social networks in organizational socialization, i.e. how newcomers learn to perform in the job and adjust to work. Unfortunately, much less is known about how newcomers' social networks and related resources develop over time. We collected data on newcomers' personal networks three times during year and a half after organizational entry. We measured two central indicators of network-based resources: network density and contacts at higher organizational level (upper reachability). In addition, the newcomers evaluated to what extent they give information and advice to their network ties. We also measured the quality of newcomers' working relationships with their supervisors (leader-member exchange, LMX) and coworkers (coworker exchange, CMX) in order to examine antecedents of network-based resources. The preliminary results showed that there was decrease in newcomers' network ties at higher organizational level. The results further indicated that newcomers' increased their information and advice giving to their network ties over time. Finally, preliminary results showed that LMX related to number of network ties at higher organizational level and CMX related to network density.

Membership in the House Ball and Gay Family Communities and effects on HIV protective behaviors among a population based sample of young Black Men who have sex with men (YBMSM)

Adam Jonas (Chicago Center for HIV Elimination, University of Chicago Medicine), Lindsay Young (Chicago Center for HIV Elimination, University of Chicago Medicine), Stuart Michaels (NORC at the University of Chicago), Joel Jackson (Chicago Center for HIV Elimination, University of Chicago Medicine), Mario Pierce (Chicago Center for HIV Elimination, University of Chicago Medicine), John Schneider (Chicago Center for HIV Elimination, University of Chicago Medicine)

HIV prevention scholars have turned their attention to the long-standing House Ball Community (HBC), a predominately African-American national collection of organizations (houses) that compete in gender expression competitions called balls, as an important partner in preventing the spread of HIV. Since members of the HBC are demographically at particularly high risk for HIV, intervention efforts have focused on houses as prospective agents of change in the broader gay and Transgender community. Intrinsically linked to the HBC, yet receiving even less attention from researchers are gay families, choice kinship structures often thought to confer social support to MSM and Transgender individuals which are locally based and of less stature than the larger national houses. Additionally, a majority of the still scant information on HIV risk among HBC or family affiliated individuals comes from only three major metropolitan areas – New York City, The San Francisco Bay Area, and Los Angeles. To the authors' knowledge, this research project is the first of its kind to compare HIV protective factors among family and HBC members to the

broader BMSM population while untangling the unique roles families play in forming bridges among houses. Data is drawn from a respondent-driven sample of 618 BMSM and TF living in South Chicago collected as part of the uConnect study. 206 (33.6%) of respondents report an affiliation with 36 different houses or families. A two-mode network matrix was then constructed of respondents and their house and/or family associations. These networks were investigated as both a two-mode network and a transposed one-mode network of respondents connected by their co-membership in a house or family. House and/or family members tended to be younger, lower income, and more likely to have been jailed previously than others in the sample. Findings also suggest that HBC and/or gay family members have a similar prevalence of HIV, condomless sex, and group sex yet are more likely to receive timely HIV testing. Network visualizations, betweenness centrality, and qualitative interviews show gay families may act as brokers between members of different houses. This is supported by qualitative interviews which assert houses are more focused on winning balls and have selective membership based on the ability to 'walk' in gender expression categories while families are more focused on providing traditional social support structures and nurturing more affective ties. Analysis on several HIV protective behaviors using permutation tests and group level E-I indices indicate HIV status and recommending condom use is homophilous among members of certain families and houses, suggesting some protective factors may be clustered around certain houses or families. To further disentangle this relationship, 2-mode ERGM analysis will be used to model if protective behaviors are clustered around certain houses or families suggesting homophily or diffusion effects. Quantitative analysis will be informed by interviews with prominent members of the Chicago HBC and gay family communities. Suggestions are offered for how researchers may leverage HBC and familiar network structures to speed the diffusion of HIV prevention information to stem the disproportionate rates of HIV infection among YBMSM.

Partner Choice and Reciprocity in Hadza Food Sharing Preferences

James Holland Jones (Stanford University), Brian Wood (Yale University)

In this study, we seek to clarify the motives of food possessors and scroungers among Hadza hunter-gatherers of the Lake Eyasi Region of northern Tanzania, and to evaluate the hypothesis of reciprocal food sharing among the Hadza. Previous research on food-sharing among small-scale, subsistence populations suffer from poor control over potentially confounding variables (e.g., kinship, spatial association) and frequently depend on the questionable assumption of dyadic independence. We collected two types of data for these purposes: (1) name-generator data on preferred alters within camp for food sharing, and (2) qualitative interviews where subjects responded to a vignette in which their children were refused shares of food by a neighbor who had received food from the subject in the past. Using these data, we take up four specific questions: (1) Is there evidence for mutuality in the Hadza's choice of preferred sharing partners? (2) To what degree does kinship predict the choice of preferred sharing partners? (3) How did gender homophily (which defines spatial associations in daily activities in Hadza camps) influence subject's choice of sharing partners? (4) What attitudes are expressed regarding those who fail to repay past sharing? Using exponential random graph models (ERGMs) combined with a multi-model inference framework, we show that kinship, gender homophily, and reciprocity have strong and quite consistent positive effects on the likelihood of a directed tie in the nomination network. Low cost forms of punishment, such as refusing to talk to or share with someone in the future, were discussed much more frequently than more active and potentially costly punitive actions. Our interviews suggest that while reciprocal obligations are culturally recognized and preferred, defections from strictly reciprocal sharing are common and well-tolerated among those interviewed. In light of these results, we suggest that stable, mutual relationship are a central feature of the Hadza's food-sharing economy, and that these mutually beneficial associations arise from kinship, gender, and through a continued commitment to a willingness to give when the other partner is in need. These reciprocal food-sharing relations form the foundation of risk management in this subsistence population.

Latent Cognitive Social Spaces: theory and methods for extracting prejudice from text

Kenneth Joseph (Carnegie Mellon University), Kathleen Carley (Carnegie Mellon University)

An identity label, or simply an identity, is a term that conveys a culturally-shared meaning of a person or group of people. Identity labels exist for things like our physical characteristics (e.g. "tall person", "handsome", "man") and the social roles we take on in everyday life (e.g. "lawyer", "doctor"). Identities are thus central to how we communicate social information.

The proposed talk would focus on our recent work that seeks to better understand the associative and affective meanings of identities, how these meanings are intertwined with social structure and how to extract these meanings from text data. By associative meaning, we refer to an identity's meaning as defined by its relationships to other identities (e.g. the associative meaning of "nurse" consists largely of its strong relation to identities such as "doctor" and "patient"). By affective meaning, we refer to how people feel about an identity (people tend to respect "nurses").

Collectively, these two forms of meaning for an identity can be referred to as a prejudice held towards that identity. While these two dimensions of prejudice overlap in important ways - how we feel about an identity, or a group of people, is heavily correlated with the other identities we associate with it - the extent of this correlation is unclear. Further, how social interaction, institutional structures and macro-level social structures combine to influence these two types of meaning is also uncertain.

Theoretically, our talk would introduce work on a new mathematical theory of prejudice that hopes to address these issues. The theory, Latent Cognitive Social Spaces (LCSS), aims to provide a parsimonious explanation of prejudice at the individual, interpersonal, group and culture-wide levels by blending existent research in social psychology, social network analysis, cognitive psychology and statistics. Pertinent to the theme of the organized session, LCSS is explicitly developed to formulate a mathematical model that asks "how does prejudice spread?", and more importantly, "how can negative prejudices be reduced?" by incorporating understandings of interpersonal relationships, institutional influences, intergroup biases and both the associative and affective dimensions of prejudice.

Empirically, the talk would briefly discuss two veins of ongoing empirical work on how we have begun to try to extract prejudice as defined by LCSS from text, specifically from Twitter and newspaper data. The first vein of work explores the development of a model of a classifier that can be used to extract the identities, or (roughly), the categories of people that individuals have prejudices of. The second vein of work focuses on the joint extraction of the associative and affective meanings of identities using a novel Bayesian framework. Data for this empirical work is drawn from two case studies- one relevant to the Eric Garner and Michael Brown tragedies and one relevant to the "Arab Spring".

Surveying networks in comparative perspective: a social capital approach

Dominique Joye (UNIL), Marlène Sapin (FORS & UNIL), Christof Wolf (GESIS)

The International Social Survey Programme (ISSP) will propose a module on Social Networks and Social Resources to be adopted by the General Assembly in 2016 and fielded in 2017. We expect that data for this module will be collected in more than thirty countries around the world. To develop a reliable and valid instrument the drafting group for this module designed an extensive pretest questionnaire that was fielded in eight countries (CH, CN, DE, FR, TU, TW, UK, VZ) and involved more than 3,000 respondents surveyed in different modes. While developing this module we were faced with the following major challenges: 1) How to measure social networks in a comparatively short survey, ISSP modules are constraint to sixty items? Our proposal is to use a combination of position and resource generators. a) For selecting occupations for the position generator we use canonical correlation (of the first root) between positions and dependent variables and choose the subset of occupations that maximises correlations with dependent variables. b) For the resource generator, it is not obvious how to choose among a long list of potential support, ranging from help by individuals to institutional support. In the pretest we designed we try to tackle this problem by using a split ballot experiment testing different formats. 2) In which domains should the impact of social networks and social resources be studied? According to the interest of the drafting group and the tradition of ISSP we focus on life satisfaction and health, social integration and political resources as well as attitudes toward the state. In our presentation we will present our analysis of the pretest data and show how we propose ISSP should measure social networks and social resources and in which domains it seem promising to study network effects. Of particular interest to us is how we can ensure that the proposed instruments yield reliable and valid data in very different countries. This is particularly important since the ISSP is present on all six continents.

Network Structure and Industrial Clustering Dynamics in the Aerospace Industry

Raja Kali (University Of Arkansas), Ari Van Assche (HEC Montreal), Ekaterina Turkina (HEC Montreal)

We use a new firm level dataset to study the network of formal firm linkages within and across 52 aerospace clusters in North America and Europe over the period 2002-2014. Applying community structure detection techniques, we find that the structure of the overall network has changed over time. We organize sub-networks by linkage type

and find two important trends in their evolution. First, new linkages in the vertical buyer-supplier sub-network are generally formed in a hierarchical hub-and-spoke fashion, whereas new links in the horizontal partnership sub-network are generated in a more decentralized and cohesive manner. Second, the geographical scope of new linkages is different, with vertical buyer-supplier and investment linkages moving increasingly trans-local and partnership linkages becoming more localized. Taken together, our findings suggest that the overall network is evolving from a geographically partitioned community structure to a hierarchical community structure that is stratified along value chain stages.

Using web 2.0 to support collaboration in the occupational context - analysing the use phase

Daniel Kammerl (Technical University of Munich), Julian Wilberg (Technical University of Munich), Udo Lindemann (Technical University of Munich)

For many years collaboration clusters have proven to be successful. One well-known example for a collaboration cluster in IT and high-tech industry is Silicon Valley. This merger of local companies with similar subject areas is transferred to other areas and sectors of industry. Companies organize in industrial clusters to exchange knowledge, to identify new possible actions for cooperation and to improve the regional competences for a special industry sector. By enabling access to a common resource pool cost can be reduced, synergies can be used and knowledge can be generated. The cooperation of regional companies in cooperation clusters poses new challenges concerning management and organisation because clusters connect different companies and organisations which have different company philosophies, are using different tools and are located in different locations. To support the cluster administration of a corporate cluster the chosen approach was to use web 2.0 tools to enable companies and people to organise themselves, exchange data and cooperate with each other. Such virtual networks support exchange and acquisition of knowledge, which is why many institutions and companies want to use these new communication and information technology for themselves. This so called Professional Virtual Communities allocate a platform to participate in the exchange of knowledge for people with common interests, backgrounds. However, the effectiveness of these networks is very dependent on the structure and activity of its members. The results presented in this paper were elaborated in cooperation with a German industry cluster that consists of more than 100 partners from industry and research. In line with interviews and a digital questionnaire which were undertaken before the start of the cluster platform the requirements, prospects and drawbacks a web 2.0 platform used in the occupational context were determined. After providing the platform to the public, the usage data were analyzed by using metrics of social network analysis. Based on these results a further survey was performed to answer questions, which couldn't be answered by means of the data present and to validate the results at hand. The results contain information regarding the usage of the platform and its functionality as well as interconnectedness of the users and provide an indication of further network analyses.

Evaluating global health partnerships: a case study of the Gavi HPV vaccine application process in Uganda

Carol Kamya (Infectious Diseases Research Collaboration), Peter Waiswa (Makerere University School of public Health), Gilbert Asimwe (Infectious Diseases Research Collaboration), Faith Namugaya (Infectious Diseases Research Collaboration), Emily Carnahan (PATH), Jessica Shearer (PATH)

Introduction: Gavi, the Vaccine Alliance was an early adopter as a public-private partnership bringing together country governments, United Nations agencies, vaccine manufacturers, non-governmental organizations and research institutes to achieve Gavi's mission to save lives and protecting peoples health by increasing access to immunization in poor countries. Gavi commissioned a 4-year prospective evaluation (named Full Country Evaluations) in four countries with the aim of measuring vaccine coverage, documenting policy change including the effect of partnership on decision making, planning and implementation of Gavi support. This study outlines an approach to evaluating the effectiveness, efficiency, and legitimacy of global health partnerships specific to the process surrounding the Government of Uganda's application for Gavi funding for national introduction of the Human Papilloma virus vaccine (HPV).

Methods: In order to test the partnership framework in action, a mixed methods case study was embedded in an ongoing prospective evaluation of the process of new vaccine decision-making and implementation in Uganda. The HPV vaccine application process was chosen as a suitable case because of its timeliness in relation to planned data collection and the potential of applying lessons learned to both the ongoing implementation of HPV in Uganda as

well as to other new vaccine applications in Uganda and elsewhere. Data collection included document review and in-depth interviews including a structured network survey with key informants at national level partners involved in the application process. Notes from the interviews were transcribed into the partnership framework and were coded by hand using pre-determined coding structures while the survey data was analyzed using UCInet.

Results/Conclusion: Seven key informant interviews were conducted and 11 networks surveys were administered to the national level partners involved in the HPV vaccine application process between August and October 2014. We found that partnership around HPV application was strong, and this was partly attributed to several contextual factors: past immunization partnership experiences, including that of the HPV demonstration project; the existence of champions; political priority around cervical cancer; and high levels of trust. Our analysis of the network data indicates that the network structure displayed structural attributes consistent with other partnerships including relative decentralization, moderate density in the network core, and high average levels of trust. However, network mapping also uncovered 'missing' actors, which may have led to premature decisions about whether HPV vaccine should be delivered through the health system or in schools. HPV vaccine application partnership was perceived to have been effective but inefficient and this is potentially related to the lack of accountability mechanisms, terms of reference or other guidelines related to partnership. There's need for greater inclusion of existing diverse actors like the private sector and other ministries in future application processes.

Effects of Teaching Practice on Classroom Friendship Networks

Maedeh Aboutalebi Karkavandi (University of Melbourne), Heidi Gazelle (University of Melbourne), Garry Robins (University of Melbourne), Vicki McKenzie (University of Melbourne)

Friendship ties among children at school may arise through network self-organization processes, individual attributes, and exogenous factors. In this study, we investigate the contribution of the teacher as an exogenous factor on the students' friendship network over a school year. Teachers may affect social relations in the classroom through providing or limiting students' social interactions, a general affective tone of the classroom, and management of extreme status (e.g. isolated students). Research participants were 688 third grade and 714 fourth grade students (48.5% boys) in 46 classrooms. Teaching practice - which can affect classroom climate - was measured at the commencement of the school year before the classroom networks were established, and friendship ties were measured at the year's end. Observers rated the quality of classroom climate using the Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). CLASS has three domains: emotional support, instructional support, and classroom organization. Classroom climate is measured as the average of these three domains. Emotional support refers to the global affective tone of a classroom; instructional support focuses on the way the teacher delivers teaching content; and classroom organization refers to teacher management of time, classroom resources, and children's behaviour. We expected that positive classroom climate would encourage friendship formation, and that emotional support would be the strongest predictor of friendship network density at year's end. To test these hypotheses, we used Exponential Random Graph Models, controlling for network self-organizing structural process and taking into the account dependency among network ties. We ran ERGMs simultaneously across all classrooms, with models where classroom climate, emotional support, instructional support and classroom organization were used as covariates for each class. Emotional support was a significant predictor of friendship ties for third-grade classes (overall classroom climate was close to significant). However, the different measures of teaching practice were not significant predictors for fourth grade. Results for third-grade classrooms were in line with our predictions. Emotional support was significantly associated with the formation of friendship ties. However, the absence of significant results for fourth grade suggests third grade may be a critical age for the influence of teachers on student classroom relationships.

Evaluation of a regional network for the inclusion of persons with impairments

Christiane Kellner (Technical University of Munich)

From the perspective of people with disabilities, inequalities can also emerge from spatial segregation, the lack of social contacts or limited economic resources. In order to reduce or even eliminate these disadvantages and increase general well-being, community-based participation is essential. Also the UN-Convention on the Rights of Persons with Disabilities, which Germany also ratified, postulates the necessity of Living independently and being included in the community (Article 19).

Through the creation of a regional network with representatives from various institutions and organisations, the “Segeberg District Inclusion Network” (March 2013–March 2016), initiated by the Lebenshilfe Bad Segeberg, aims to improve these local conditions so that persons with disabilities can actively participate in civic life. Since a diverse society is a society in which different individual needs and wishes can emerge and be catered to, the ultimate goal of the network is to create an environment for every citizen – regardless of disability, age or ethnic background – that accommodates their daily activities and requirements. The network was launched by six founding members in 2013 and now includes 17 participants from the Segeberg district. Members are e.g. municipalities, facilities for people with disabilities, churches as well as associations. They focus on the self-determination and participation of persons with impairments in various areas of life, such as leisure, work, housing and education. Beside regular network meetings, participants exchange information through various media (email, phone, etc.) as well as at public and private events.

The aim of the study is the evaluation of the network-building itself as well as the actual networking activities, the attainment of targeted project goals and the sustainability of the project. Therefore, a mixed methods approach is required.

The following four dimensions of network evaluation are emphasised:

- o Network context: pertains to data on the constitution (homogeneous or heterogeneous) and openness of the network (relationship between internal and external networking). It is collected with the help of a questionnaire and qualitative interviews
- o Network aim: in the sense of the network’s intention and its self-concept
- o Network structure: on the one hand, quantitative network analyses are carried out in order to illustrate the structure of the network. A particular focus here is on the density, the centrality and the accessibility of single actors as well as the existence of typical roles, such as e.g. stars, gatekeepers, bridging actors, etc. Other aspects analysed include the contact frequency, the type of contact, the time invested to keep up as well as the mutual commitments of the various actors within the network. On the other hand, qualitative methods are used to obtain opinion scales on the network itself and its driving purpose as well as to evaluate the cooperation based on the various performance indicators of a productive cooperation culture
- o Content of the network relationship: can be assessed through the network output

These issues underpinned the quantitative network analysis as well as the qualitative guided interviews, the document analysis and qualitative network analyses I carried out.

EgoWeb 2.0: Open-Source Software for Collecting and Analyzing Ego-Centric Network Data

David Kennedy (RAND Corporation)

This presentation will provide information about the development and use of the software EgoWeb 2.0 including an overview of how to access it and a discussion of recent developments. EgoWeb is open-source survey software developed to address the challenges associated with collecting and processing egocentric/personal network data. The collection and analysis of personal network data can be challenging for investigators, interviewers, respondents and data analysts. The presentation will discuss the history of evolution of EgoWeb from the open source software EgoNet. EgoWeb has been designed to reduce the burden of collecting and analyzing personal network data. EgoWeb has been developed by researchers at the RAND Corporation, UCLA, and the University of Florida over the past 6 years. It has been used to address a variety of research questions with a variety of populations, including homelessness, HIV risk, substance use of adults in adolescents, professional network development of novice librarian researchers, and marriage formation of low-income couples. It runs on a variety of platforms and can be used to collect network data in a variety of settings including field data collection using Mac and Windows laptops, iPads, and android tablets. It can also collect respondent-entered data through email invitations. Names of alters can either be entered from scratch or chosen from a list of eligible alters. EgoWeb has extensive and flexible skip-logic and a variety of question presentation options. It has been designed to enable non-programmers to easily set up and run egocentric data collection instruments. EgoWeb conducts basic processing of data that can be further analyzed with other analysis platforms, such as R. The presentation will discuss several recent developments including 1) extensive presentation options for network visualizations during interviews, including note capture fields, in order to facilitate mixed-methods data collection; 2) longitudinal data collection options for re-interviewing the same respondents and customizing interviews based on data collected in previous interview waves; 3) the link between EgoWeb and the RAND American Life Panel which allows for egocentric data collection with a large panel sample of respondents representative of the United States. The presentation will conclude with a discussion of how to access EgoWeb’s open source code (hosted on the software sharing website Github) and how to collaborate with EgoWeb researchers to develop new and/or improved customized features.

The evolution of the personal networks of novice librarian researchers

Marie Kennedy (Loyola Marymount University), David Kennedy (RAND Corporation), Kristine Brancolini (Loyola Marymount University)

This presentation reports the findings of an analysis of personal network data gathered from the novice librarian researcher participants of the first year of the Institute for Research Design in Librarianship (IRDL), an institute designed to provide instruction in how to conduct a research project and establish a peer-network of like-minded librarians to support each other throughout the research process. Analysis of the first year of data (four waves) will be discussed in this presentation. The data gathered is about the people and the strength of the relationship in the personal research networks of each of the IRDL participants. During the presentation we will report on the observations of the networks over a year's time and show you visually how they evolved. The results have implications for how librarians develop themselves, and may influence the future of libraries generally.

A highlight of this presentation is to focus on our methodological decision to gather the four waves of data in survey format. We will describe the mechanism used to gather that data, the freely available, open source, web-based software used to gather personal network data, EgoWeb 2.0. We will describe the process of customizing the survey software to ask questions about the people in the librarians' research networks. We will demonstrate the computations that the software provides, as well as the attractive visualizations of the personal networks.

Social Network Analysis through Perceptual Tomography (SNAPT)

Bilal Khan (University of Nebraska-Lincoln), Kirk Dombrowski (University of Nebraska-Lincoln)

The SNAPT data collection system enables the rapid discovery of the social networks of participants, under conditions of respondent anonymity, and where informants may not themselves know the full (named) identity of those in their social network. In addition, SNAPT seeks to circumvent masking effects that are likely to arise in contexts where subjects are biased in declaring (or withholding) information about their own social ties, but where network ties are perceivable by third parties. SNAPT achieves this by building on matching techniques of "propitious aggregation" in network data collection, and "multiple perspective" techniques from semantic link analysis.

The SNAPT platform is presently implemented for consumer tablets running the Android OS. It uses "selfie" images taken using the tablet's digital camera and presents each subject with a series of "drag and drop", visual clustering, and object labeling tasks which involve the selfies of previous subjects. These data are combined analytically to yield relative estimates of pairwise social network distances, as well as the perceived properties of individuals and subgroups. To confirm that SNAPT provides good proxies for pairwise distances between study subjects, we conducted computer simulations on artificial Barabasi-Albert social networks. In these networks, each "individual" was assumed to recognize a random subset of the population at large. We then simulated the sequential recruitment of "subjects" via respondent driven sampling (RDS) starting from a random seed, and simulated these subjects' engagement with the SNAPT platform. By using the simulation data as the basis of a new computable proxy for pairwise distances, and comparing this proxy to the ground truth as reflected in the artificial network, we are able to evaluate the fidelity of SNAPT's distance estimates and the factors influencing the accuracy of the new network mapping techniques proposed.

In this talk, we describe the SNAPT platform, its design and operation, the social network data it generates, recent applications of the new platform and paradigm, and future research directions.

Multilevel Socio-Material Network Analysis of Artistic Organizations: Combining Ethnographies and Exponential Random Graph Models

Anisya Khokhlova (St. Petersburg State University), Nikita Basov (St. Petersburg State University)

This paper applies multi-level network analysis techniques to examine relations between social structure of an artistic organization and structure of the material context it is embedded in. The role of space and materiality for artists has been widely recognized (Carlozzi et al. 1995; Meusburger 2009; Griswold et al. 2013), as they are particularly responsive to stimuli from material environment. Based on Bourdieu's ideas on the relatedness of social and physical spaces, in our study we inquire how the structure of collaborations and friendships between members of an artistic

organization is related to their usage of shared material objects and links between those. Following the strategy of case-study, we focus on two artistic organizations that operate in Barcelona and Hamburg. Institutionalized as an educational project and a co-operative society respectively, these consist of creative professionals eager to accommodate their working, exhibiting, interaction and exchange (in one case also living) spaces beneath a shared roof. Following Bourdieusian logic, we expected the members to use similar configurations of material objects in the common spaces of artistic work and/or living and leisure (from furniture and tableware to the artworks that the members produce, discuss and promote). Using such data as ethnographic observations, interviews, photo elicitations and sociometric surveys, we map multilevel networks of relations between individuals and between objects as well as of bipartite relations between the two nodesets. Generally, estimation of exponential random graph models including within- and between- level configurations reveals rather low sharing of objects in the networks of both organizations, which seems to undermine the theory. Yet, consideration of cross-level configurations including both within- and between- level lines shows that sharing of objects and structures of objects is related to ties between friends and collaborators. For example, objects involved in certain patterns of physical relations with each other through collective practices, e.g. used as part of same activities (like a canvas and a brush) and/or co-located in creative spaces (like a cup on a plate) are more likely used by befriended artists. Using ethnographic data allows to understand the reasons for the inhomogeneity of the effects across networks: in both organizations artists belong to different artistic (sub)fields. Due to the lack of joint creative practices, they express and reproduce this split in interactions and objects usage. Thus, combining quantitative methods with qualitative ones and jointly considering social and material networks as multilevel constructs allows not only to formally prove the co-dependence between structure of collaborations and friendships and structure of the material context it is embedded in, but also to shed more light on the logic of structure formation in an artistic organization.

An Application of Social Network Analysis to the Comorbidity Study of DSM-IV Mental Disorders

Hanjoo Kim (Penn State University), Michelle Newman (Penn State University)

Background: Mental disorders often co-occur. High comorbidity among mental disorders has hindered clinicians from making accurate diagnoses and proper treatment plans. In order to solve these problems, researchers have examined commonalities between mental disorders. However, classical statistical approaches cannot capture interdependencies between different mental disorders. In this sense, comorbidity research may greatly benefit from social network analysis which takes into account the more holistic structure of the relationships. In this study, we applied a social network analysis approach to the data from the Collaborative Psychiatric Epidemiology Surveys (Alegria, Jackson, Kessler & Takeuchi, 2007).

Methods: The Collaborative Psychiatric Epidemiology Surveys were collected from 2001 to 2003 to identify prevalence and comorbidity of 23 mental disorders. In these surveys, structured interviews were conducted on 20,013 individuals in general population based on twelve-month DSM-IV criteria. For social network analysis, each mental disorder was entered as a node and correlation coefficient between each pair of mental disorders was entered as a weighted tie between the nodes.

Results: Among 20,013 participants, 36.32% of the sample (7,269) reported that they suffered from one or more mental disorders. However, cohesion analysis showed that the comorbidity network had a high density ($M = .72$, $SD = .17$) suggesting that mental disorders have high co-occurrence within a relatively small portion of population. On the other hand, results from centrality analysis showed that dysthymia was the most co-occurring disorder among all mental disorders. Degree centrality of dysthymia was 17.62 and betweenness centrality was 55, which showed that it had the most connectivity with other nodes, and acted as a bridge between different pairs of mental disorders. However, major depressive disorder, which is a more severe mood disorder, had lower degree centrality (14.32) and betweenness centrality (.16) than those of dysthymia. A similar pattern was found in bipolar I and bipolar II. Similar to the relationship between dysthymia and major depressive disorder, diagnostic criteria for bipolar II consists of milder symptoms as the highs in bipolar II, called hypomanias, are not as high as those in bipolar I (manias). Unlike bipolar I, which gained the lowest degree centrality (10.54), bipolar II yielded a higher degree of centrality (16.20). On the other hand, core-periphery analysis revealed that PTSD had the lowest multiplicative coreness (.19) among all anxiety disorders. Core-periphery analysis also showed that PTSD could be better explained as a separate cluster.

Conclusion: In this study, a substantially small portion of the sample reported mental disorders. However, once they met diagnostic criteria, they were likely to experience more than one disorder. In addition, results from centrality

analysis indicated that severity of mental disorders was associated with comorbidity. On the other hand, core-periphery analyses showed that PTSD might have a different nature compared to the other anxiety disorders and provides evidence for its separation from anxiety disorders in DSM-5. These results show that the application of social network analysis to the comorbidity of mental disorders can bring abundant findings which have not been available by classical statistical methods.

Exploring Change of Teachers' Social Networks within Elementary Schools in Korea

Chong Min Kim (Gyeongin National University of Education)

Research over two decades has shown that teachers' social networks in schools and school districts can be a source of various resources, including expertise (Daly & Finnigan, 2010; Frank et al., 2004; Kim, 2011), trust (Bryk & Schneider, 2002; Louis, Marks, & Kruse, 1996), teachers' job satisfaction and happiness (Kim, 2015), opportunities for joint sense-making (Coburn, 2001; Spillane, 2004), and innovation through peer pressure or a sense of obligation (Frank, Zhao, & Borman, 2004; Penuel et al., 2013). Additionally, studies indicate the importance of social capital in enabling instructional reform and school improvement (Bryk & Schneider, 2002; Frank, Zhao, & Borman, 2004; Louis & Kruse, 1995; McLaughlin & Talbert, 2001; Rosenholtz, 1991; Smylie & Hart, 1999; Spillane, Kim & Frank, 2012). Although these studies have investigated the various effects of teachers' social networks with focus on reading and mathematics subjects, change of teachers' social networks have not been examined in schools in Korea. Thus, I explore change of teachers' social networks in Korea: that is, the tie change of elementary teachers' close colleague networks and elementary teachers' advice and information networks in Korea. My research question is this: What affects change of teachers' social networks within elementary schools in Korea? The dependent variables were teachers' social networks within schools in Spring 2014 and Fall 2014 (two time points), while independent variables are teachers' attributes, such as leadership position, classrooms-contained teacher, teacher job satisfaction, teacher happiness, and teacher-teacher trust of elementary teachers in 18 schools in 2014. This study will use RSIENA (Simulation Investigation for Empirical Network Analysis) and Statnet software for data analysis.

The researcher expects that different network patterns of teachers' social networks will exist across 18 elementary schools in Korea. Findings will indicate that elementary teachers' social network can affect establishing professional learning community and innovative school climates by influencing teacher collaboration. Based on these results, discussion and conclusion will be provided with focus on elementary professional learning community (PLC) and school innovation.

Social network targeting to maximize population behavior change: a cluster randomized controlled trial

David Kim (Harvard University), Alison Hwang (Harvard University), Derek Stafford (Yale University), Alex Hughes (UCSD), James O'Malley (Dartmouth College), James Fowler (UCSD), Nicholas Christakis (Yale University)

Background Information and behavior can spread through interpersonal ties. By targeting influential individuals, health interventions that harness the distributive properties of social networks could be made more effective and efficient than those that do not. Our aim was to assess which targeting methods produce the greatest cascades or spillover effects and hence maximize population-level behavior change.

Methods In this cluster randomized trial, participants were recruited from villages of the Department of Lempira, Honduras. We blocked villages on the basis of network size, socioeconomic status, and baseline rates of water purification, for delivery of two public health interventions: chlorine for water purification and multivitamins for micronutrient deficiencies. We then randomized villages, separately for each intervention, to one of three targeting methods, introducing the interventions to 5% samples composed of either: randomly selected villagers (n=9 villages for each intervention); villagers with the most social ties (n=9); or nominated friends of random villagers (n=9; the last strategy exploiting the so-called friendship paradox of social networks). Participants and data collectors were not aware of the targeting methods. Primary endpoints were the proportions of available products redeemed by the entire population under each targeting method.

Findings Between Aug 4, and Aug 14, 2012, 32 villages in rural Honduras (25-541 participants each; total study population of 5773) received public health interventions. For each intervention, nine villages (each with 1-20 initial target individuals) were randomized, using a blocked design, to each of the three targeting methods. In nomination-targeted villages, 951 (74.3%) of 1280 available multivitamin tickets were redeemed compared with 940 (66.2%) of

1420 in randomly targeted villages and 744 (61.0%) of 1220 in indegree-targeted villages. All pairwise differences in redemption rates were significant ($p < 0.01$) after correction for multiple comparisons. Targeting nominated friends increased adoption of the nutritional intervention by 12.2% compared with random targeting (95% CI 6.9-17.9). Targeting the most highly connected individuals, by contrast, produced no greater adoption of either intervention, compared with random targeting.

Interpretation Introduction of a health intervention to the nominated friends of random individuals can enhance that intervention's diffusion by exploiting intrinsic properties of human social networks. This method has the additional advantage of scalability because it can be implemented without mapping the network. Deployment of certain types of health interventions via network targeting, without increasing the number of individuals targeted or the resources used, could enhance the adoption and efficiency of those interventions, thereby improving population health.

Search in Networks with Vacancies: The Case of Board Interlocks

Mitri Kitti (University of Turku), Matti Pihlava (University of Turku), Hannu Salonen (University of Turku)

We present a model for the dynamics of networks in which edges represent vacancies, holders of which are connected to each other when the vacancies belong to the same organization. Once a vacancy is opened, the new holder of the vacancy is searched from the current network, or the vacancy is filled by choosing a person outside of the holders of vacancies. In essence, opening and filling vacancies correspond to rewiring of edges of a two-mode network. The search may involve preferential attachment in the sense that persons with a high number of board positions are preferred over persons with a lower number. Moreover, the search may rely on referrals; the further away a candidate is in the network from the firm having the open vacancy, the less likely it is that the candidate is chosen.

Our search process has a number of distinguishing features that make it different from network search models presented in the previous literature. First, the focus is on the evolution of the network, while in many of the labour market search models network structure is not modelled or it is exogenous. Second, in our model the search is directed because only the firms search for employees. Third, a crucial element of a two-mode network is that an individual may hold several vacancies in different organizations at the same time. Fourth, the set of individuals is not fixed; only firms and vacancies stay the same. The last feature means that when time goes on arbitrarily many people may have held a vacancy. This is in contrast to most of the existing models for network formation where the set of possible vertices is kept fixed.

Microeconomic foundations of the search process are discussed. The properties of the conditional probability of recruiting a candidate are related to companies' risk preferences and the properties of candidates' productivity distribution. The particular case in which the conditional probability is determined by the exponential function in the spirit of logistic regression is related to CARA preferences and normally distributed productivity.

Our search model is in principle applicable to any two-mode network where the vacancies are fixed. Such situation is typical for representative organs of various organizations such as boards of companies, which is our main application. We demonstrate the performance of the search model in explaining the formation of interlocking directorates among Finnish companies.

Dynamic Interactions of Social Networks and Health of Long-Term Unemployed: Results from a Qualitative Research Project in Germany

Andreas Klaerner (University of Rostock), André Knabe (University of Rostock), Sylvia Keim (University of Rostock), Hagen Fischer (University of Rostock), Markus Gamper (University of Cologne)

Empirical studies and meta-analyses have shown consistently that there is a clear connection between social and health inequalities (e.g., CSDH 2008; Marmot et al. 2012). Theoretical and empirical explanations for this nexus of social and health inequalities focus on structural aspects such as public health care systems, environmental factors such as working and living conditions, behavioral factors such as risk-taking behaviors, and psycho-social factors such as stress (cf. Moor et al. 2014; Richter, Moor, Lenthe 2012; Leon, Walt 2001). Research on psycho-social factors influencing health increasingly focus on the relational aspects of personal contacts and consider theoretical concepts such as social capital, social support, and social integration (e.g., Berkman, Glass 2000; Kawachi, Subramanian, Kim 2008; Rostila 2013). In this context there is also a growing body of research that uses the potentials of social network analysis in (public) health research (cf. Smith, Christakis 2008; Valente 2010). Social network approaches are sensible

for the effects of the embeddedness of individual health behaviors in structures of social networks. These structures are shaping causes and consequences of health and health care (Pescosolido 2006) and play a mediating role between macro social conditions and individual pathways and health behavior (Berkman, Glass 2000). Mostly social networks are conceived of as intermediate level between macro structures and individual health behaviors (Berkman, Glass 2000). This perspective tends to take a one-directional view where macro-structural factors (culture, socioeconomic factors, politics, and social inequality) condition the shape and structure of social networks which in turn impact health through behavioral, psychological, and physiological pathways. Yet, this top-down-perspective underestimates the bottom-up-processes of how individuals shape their networks and how networks evolve through life course changes over time. Our research aims at exploring the complex interactions between social networks, health, and social inequality in a dynamic perspective. We focus on the lower social status group of long-term unemployed persons, and analyze their well-being and coping with health problems as “embedded” (Granovetter 1985) in networks of social relations. We ask: 1.) How do health status and changes in health affect the structure and qualities of social networks? 2.) How do social networks influence well-being and coping with health problems? 3.) How do networks and health interact in a dynamic perspective?

We are applying qualitative research methods that recently have received much attention in health research (e.g., Saks, Allsop 2013). The strength of qualitative methods lies in giving priority to the participant’s perspective: by collecting the people’s subjective meaning to experiences and opinions, qualitative researchers are able to explore structures and mechanisms invisible before and to enhance inquiry validity (Neale 2009; Guest, Namey 2015). Qualitative methods contribute to middle-range theories by helping to understand individuals’ logic of actions (Green, Thorogood 2014). We are drawing on qualitative, problem-centered interviews (cf. Witzel, Reiter 2012) with ca. 60 long-term unemployed persons from Germany.

Family environment from a network perspective: Implications on long term impacts of genetics services

Laura M. Koehly (National Human Genome Research Institute), Christopher S. Marcum (National Human Genome Research Institute), Sunmi Song (National Human Genome Research Institute), Donald W. Hadley (National Human Genome Research Institute)

Lynch Syndrome (LS) is a dominantly inherited cancer susceptibility syndrome. One of every 370 persons is estimated to carry a LS mutation. Genetic testing facilitates the identification of family members who harbor a disease causing mutation from those who don’t, allowing focused cancer screening in mutation carriers and avoids unnecessary procedures in non-carriers. When faced with this information, family members must cope with their individual and shared risk status. The social environment that surrounds these at-risk families can be a source of coping resources, through supportive interpersonal relationships, but also a source of stress, in the form of interpersonal conflict - both of which are important predictors of psychological well-being and cancer screening behaviors. While a small body of research has examined relational outcomes among LS family members receiving genetic services, there is limited information about such interpersonal processes in those who decline genetic services. Here, we examine the structural characteristics of support and conflict networks in 34 families affected by LS, with a focus on long-term outcomes following genetic services. Specifically, we investigate 1) the position of family members based on their testing and mutation status within the support and conflict networks and 2) the association between the family and local network structure on both psychological and behavioral outcomes three years following identification of the LS mutation.

Networks of Trade and Foreign Direct Investment

Bruce Kogut (Columbia University), Jae-Suk Yang (KAIST)

We analyze trade and foreign direct investment networks through gravity models of the effect of geographic, cultural, biological, and economic distances on direct investment and trade. We also propose methods by which to reveal and visualize tax havens. Using data for 2012, the proposal compares and visualizes important properties of trade and investment networks such as skewed distributions and minimal spanning trees to identify the core network backbone. By combining standard statistical tools (e.g. regression analysis) with computational tools (e.g. visualizations, graph statistics, and simulations), our design relies on a joint statistical and computational analysis of the pattern of investment networks and the flow of investment. A novel feature of the data is the capability to measure investment

between cities that permits account tracing the economic patterns of trade and investment through migration and genetic similarities.

Trade data are taken from standard sources. The weighted graph of FDI between countries and cities are constructed by aggregation of company level data with 79 million companies and 3.6 million direct investment ties. Even though ORBIS contains information on both listed and unlisted companies, unlisted companies have lots of missing cells in the database. We use minimum spanning trees as a graph concept to visualize the high dimensionality of the data. MST algorithm chooses the most important links and reveals the backbone of the network. However, it also has an analytical value in identifying hubs, including unobserved tax havens, as explained below. Using the residuals from the gravity model, the MST of residual network can be constructed, which reveals the residual backbone of global direct investment that identifies tax havens as hubs (i.e. outliers). We further validate the model looking at networks among cities within countries to remove some of the sources of the unobserved variation across countries.

Social Networks, Stigma and Community Influences on HIV Testing and Disclosure

Emmanuel Koku (Drexel University)

Research indicates that rates of HIV testing and disclosure is low in many sub-Saharan African countries. Much of this reluctance (to test and disclose) has been attributed to HIV stigma. As informative as the stigma approach is, it ignores the fact that individuals develop attitudes, adopt norms and behaviors, and take decisions in the context of their social networks and relationships.

Although analysts have examined the relationship between social networks and the spread of HIV in Sub-Saharan Africa, there is paucity of data on the impact of social networks on interpreting, translating, and facilitating HIV prevention behaviors such as HIV testing and disclosure.

This presentation will use multilevel models to examine the relationship between communication networks, social capital, stigma and other contextual factors that affect HIV testing and disclosure decisions in Malawi. Findings will highlight implications for the design of HIV risk interventions.

Similarity Breeds/Feeds Connection, Diversity Spices It: Exploring the Structure of Advice Networks in a Community of Practice/Knowledge Network

Emmanuel Koku (Drexel University)

Increasingly, collaboration and its related emphasis on learning and advice exchange have formed the cornerstone of knowledge transfer and innovation in a variety of social arenas, from scientific research to business, education, or health. Just like other governments worldwide, the Canadian government's response to the challenge of knowledge transfer and innovation is the creation of the Networks of Centers of Excellence (NCE) program, to foster research and innovation in partnerships with industrial and government partner.

Such trends lead to the proliferation of organizational forms that have to grapple with several challenges, including how to share knowledge among geographically dispersed communities of professionals. Advances in technology, in particular, the development of e-science provides a partial answer to the extent that it provides the infrastructure for contact. But social network analysis stresses the role of informal network connections in channeling access to information and advice. Specifically, research has shown that knowledge workers benefit from diverse resources such as advice, fame and fortune from their formal and informal networks, and the structure of such network connections is crucial in enabling access to resources.

However, there is paucity of data on how contextual variables (such as managerial practices, formal policies) interact with other structural dynamics in shaping the structure of advice and information exchange networks in communities of practice. The presentation will use findings from a social network survey of two Canadian NCEs, supplemented with insights from and interviews and documentary data to explore how informal communication networks, managerial practices and governmental policy initiatives shape the structure and content of advice network exchanges in a community of practice.

Loneliness and Cortisol Associations with Friendship Network Dynamics

Olga Kornienko (Arizona State University), David Schaefer (Arizona State University), Thao Ha (Arizona State University), Douglas Granger (Arizona State University, Johns Hopkins University)

Because loneliness has deleterious health effects and describes individual's perspective on the state of their social connections, it is important to understand associations between loneliness and social network dynamics. Psychological research suggests that loneliness signals that an individual needs to increase affiliative activity and seek satisfactory social connections. Interestingly, lonely individuals also exhibit cognitive biases, negative emotions, and aversive to others behavioral patterns, which make them less attractive as a potential friend. Social neuroscience evidence indicates that loneliness elevates hypothalamic pituitary adrenocortical (HPA) activity that is associated with stress response (i.e., hormone cortisol). These patterns highlight that loneliness and cortisol levels are likely to impact network dynamics. Although past research has shown bivariate relations between social networks, loneliness, and cortisol, no studies examined these associations in a unified system. We address this gap by integrating methods from psychological science, salivary bioscience, and social network analysis and investigate the main and interactive contributions of loneliness and cortisol levels to friendship network selection as well as social influence on loneliness. Participants ($n = 193$; 53% female; M age = 19.4 years, 62.1% European-American) provided panel data on friendship networks and loneliness at the beginning and end of a semester. Participants nominated unlimited numbers of friends within a college marching band. At time 1, saliva was collected simultaneously from all participants in a group setting before and after rehearsal (3:00 PM and 6:00 PM), which was assayed for cortisol. We used a stochastic-actor based model to examine co-evolution of loneliness and friendship network. Although we did not observe significant main effects of loneliness and cortisol on network selection, two interactive effects emerged as significant. Individuals with higher levels of cortisol and loneliness were less likely to send outgoing friendship ties over time. Additionally, individuals with higher cortisol levels befriended others who had dissimilar levels of loneliness. We did not document social influence on loneliness. These findings have implications for understanding reciprocal associations between social networks, loneliness, and stress and elucidate opportunities for targeted psychosocial and network interventions to reduce loneliness and promote health.

Non-parametric analysis of bi-dynamic line-graphs for dynamic network data

Johan Koskinen (University of Manchester), Chiara Broccatelli (University of Manchester), Martin Everett (University of Manchester)

A bi-dynamic line-graph (BDLG) is a representation of a time-stamped two-mode network in terms of a line-graph where the nodes are individual event-participations and there are ties between nodes that follow each other in time and that share an individual or between nodes that share an event. We consider here a collection of constrained uniform distributions on BDLG for the purposes of comparing metrics for an observed BDLG to some null-distribution. A random BDLG may be defined in terms of a network growth process defined by a random sequence of even-participations. We propose a simple way of defining this growth process so that its aggregate two-mode structure is constrained by that of the observed BDLG.

Network Change Theory: Integrating Valente's and Watts' Models of Diffusion of Innovations

David Krackhardt (Carnegie Mellon University)

Valente, following Rogers, has shown that identifying central actors is key to implementing or diffusing an innovation. Watts has argued that this strategy is ineffective, that instead one needs to access "susceptibles" in the network and diffuse through large "Big Seed" strategies. I suggest a model that integrates both of these perspectives. This model makes the following claims: 1) Two different strategies operate on the micro and macro levels of diffusion. 2) On the micro level (groups with less than Dunbar's number of actors), it is possible to determine actors' attributes on both dimensions of centrality (powerful) and susceptibility (supportive of the innovation). 3) An optimal strategy at the micro level is to start with those high on both centrality and susceptibility (the innovators), then target those who are high on susceptibility but lower on centrality, then target those lower on susceptibility and centrality, and finally target those who are high on centrality but lower on susceptibility (the resisters). 4) At the macro level, I use Viscosity Theory and Community Detection algorithms to find "islands" of actors within the larger system. 5) The strategy suggested by Viscosity Theory is to apply the micro strategy to one "island" at a time, starting with an island that is peripheral (not central), that has relatively less interaction (fewer connections) with the rest of the

network. Finally, Viscosity Theory also suggests macro structural conditions under which diffusion can happen easily and conditions under which diffusion would be very expensive if not impossible.

Collective Rationality in the Dynamics of Popularity

Peter Krafft (MIT), Julia Zheng (MIT), Wei Pan (MIT), Nicolas Della Penna (Australian National University, NICTA), Yaniv Altshuler (MIT), Erez Shmueli (Tel-Aviv University), Josh Tenenbaum (MIT), Alex Pentland (MIT)

The ability to learn through social interaction enables the remarkable speed of human progress, yet also leads to problematic collective behaviors, from the contagion of self-destructive habits to market bubbles and crashes. How do the shared beliefs of groups come to be at times so adaptive while at other times so maladaptive? To answer this question, we propose a new model of social influence based on an analysis of a unique social network dataset from over 50,000 financial traders, and we show this model provides qualitatively better fits to our dataset than several alternatives. People appear to use popularity as a prior distribution for which decisions are best to make, which combined with a simple quality filter yields an approximately Bayesian decision scheme. This simple, boundedly rational mechanism provably leads to collectively rational belief-formation at the group level, but is vulnerable to systemic risk and manipulation.

Simplifying ego-centric network Analysis in R with egonetR

Till Krenz (Otto-von-Guericke Universität Magdeburg), Andreas Herz (Universität Hildesheim)

In ego-centric network analysis you commonly have n +many networks which you want to analyse simultaneously. However, the majority of ego network analysis is still done via software which are either not designed for relational data thus allowing only a specific set of network analysis or are designed for the analysis of a single case. The software project R - due to its modular structure - allows the analysis of n +many networks independent of input data formats. Yet the use of R for ego-centric network analysis is not as straight-forward, because a standardized solution for the data storage or analysis and the link between existing network packages in R and ego-centric network analysis was missing. To facilitate the use of ego-centric network analysis in R, we introduce a package for the import, storage and analysis of ego-centric network data, called egonetR (<http://github.net/tilltnet/egonetR>). egonetR helps with the restructuring of the collected data on ego-centric networks, and makes it available in different formats that allow to conduct the analysis using the facilities of packages like igraph and statnet. In addition egonetR provides a growing number of functions serving the computational realizations of concepts that are specific for egocentric network analysis. The presentation introduces egonetR along an exemplary analysis of network data. We show the import of differently structured raw data (e.g. long, broad format), go over to the calculation of network measures (e.g. size, isolates, subgraphs) and the visual analysis for n +many networks. We would like to use the chance, to publicize the existence of egonetR to the community of social network analysts and at the same time invite the audience to collaborate on the development of the package.

Achievement Similarity Among Friends: Selection and Influence Processes

David Kretschmer (University of Mannheim)

Schoolfriends tend to display similar academic achievement. Such similarity may stem from two potentially coexisting mechanisms: selection effects, with students choosing to befriend similar-achieving peers; and influence effects, with individuals assimilating their friends' performance over time. The simultaneous operation of these mechanisms and the potential presence of additional confounding processes of friendship formation have severely hampered the empirical investigation of selection and influence effects in academic achievement. An empirical literature on the topic is only emerging slowly, producing partially conflicting findings. In this paper, I seek to contribute to this emerging literature by analyzing longitudinal social network data with stochastic actor-oriented models to disentangle selection and influence effects in academic achievement while simultaneously accounting for potential confounders.

The empirical analysis is based on three-wave data from the Friendship and Identity in School project conducted in nine German secondary schools, which provides student data on friendship networks, background characteristics, and grades. Influence and selection effects are first analyzed separately for each student network available in the data, using stochastic actor-oriented models in RSiena. Afterwards, the results are combined in a network meta-analysis such that the analyses leverage the statistical power resulting from combining estimates from multiple networks.

The results from the stochastic actor-oriented models document the operation of both selection and influence processes after controlling for potentially confounding network and covariate effects: friends' similarity in achievement therefore stems both from the selection of similar-achieving friends and from assimilation of friends' achievement. Results vary by student gender: selection effects turn out to be negligible among male students but are strong for their female counterparts. Influence effects do not differ significantly according to student gender, though point estimates hint at potentially stronger effects for females. Selection and influence do not vary between high- and low-achieving students. Finally, though selection and influence effects are present in most of the analyzed networks, heterogeneity in effect estimates across networks is noteworthy. This indicates that analyses covering multiple networks are probably better suited to capture the empirically observed diversity in effects than the single-network analyses most previous research on academic achievement similarity is based on.

Estimation of Exponential-Family Random Graph Mixed Models with Dyadic Dependence

Pavel N. Krivitsky (University of Wollongong)

As the p^* model extended the p^* model, mixed effects are a natural extension to ERGMs to produce " p^* " Exponential-family Random Graph Mixed Models (ERGMMs). This class of models offers many possibilities; in particular, it can model triadic and other higher-order effects, while parsimoniously and interpretably controlling for individual actor heterogeneity, and allow a more parsimonious specification for multi-level models. This is at a cost of creating a doubly-intractable problem, which is currently resolved using the computationally costly Bayesian Exchange Algorithms. In this work, we propose a hybrid approach allowing the MLE to be found without requiring prior specification and a substantially reduced computational cost. We demonstrate how this approach can be used to avoid spurious detection of transitivity and apply it to data.

Social networks and breast cancer prognosis in the Pathways Study

Candace Kroenke (Kaiser Permanente Northern California Division of Research), Marilyn Kwan (Kaiser Permanente Northern California Division of Research), David Kennedy (RAND), Larry Kushi (Kaiser Permanente Northern California Division of Research)

Objective: We evaluated associations of social network size at diagnosis and breast cancer outcomes.

Methods: A total of 4,505 women from the Pathways Study diagnosed between 2006 and 2013 provided data on social networks at baseline within a few months following diagnosis. A social network index was derived from information about the presence of a spouse or intimate partner, religious/social ties, volunteering, work ties, and numbers of close friends and relatives; social network size was assessed in approximate tertiles. Functional social support was measured with the Medical Outcomes Study-Social Support questionnaire. We used Cox models to evaluate associations between social network size, recurrence, and mortality and evaluated the degree to which social support mediated associations. We also stratified by demographic, social, tumor, and treatment factors.

Results: Of study participants, 393 recurrences and 485 deaths occurred, 228 from breast cancer. In the overall cohort, after adjustment for multiple covariates including demographic, reproductive, and lifestyle characteristics; breast cancer severity; and treatment, women who were socially isolated (small networks) had worse prognosis. However, associations differed by race/ethnicity. Specifically, White women who were socially isolated (small networks) had higher risks of recurrence (HR=1.43, 95% CI:0.85-2.39), breast cancer-specific mortality (HR=2.50, 95% CI:1.35-4.61), and total mortality (HR=2.84, 95% CI:1.86-4.33), compared with socially integrated women. Adjustment for functional social support did not attenuate associations. By contrast, in non-White women, those with small or medium-sized networks had lower risks of recurrence (HR=0.65, 95% CI: 0.45-0.93), breast cancer-specific mortality (HR=0.60, 95% CI: 0.36-0.99), and total mortality (HR=0.70, 95% CI: 0.48-1.04), than socially integrated women. Consistently, non-White women with small social networks had shorter time to chemotherapy. To gain more in-depth insights about how structural social network characteristics influence breast cancer treatment and survival, we will use findings from this and other previous work to inform subsequent egocentric social network data collection in a pilot study of 100 newly diagnosed breast cancer patients. We will discuss this study design in our presentation.

Conclusions: Smaller social networks were associated with poorer breast cancer outcomes in White but not non-White women.

Searching for structures according to scientific reference frames of researchers

Luka Kronegger (University of Ljubljana, Faculty of Social Sciences), Anuska Ferligoj (University of Ljubljana, Faculty of Social Sciences), Franc Mali (University of Ljubljana, Faculty of Social Sciences)

References in scientific papers present a direct measurable link between dwarfs and shoulders of giants on which they are standing. Although some researchers noted relatively small proportion of actually read cited papers, we believe, that the citation presents a contextual link between author and cited scientific work. And more, we believe that works cited in the career of a researcher can be interpreted as a proxy of the knowledge base or the reference frame of the particular scientist. Taking into account reference frames of researchers of complete scientific community in time and computing asymmetric similarity between them, we can extract hierarchies, follow transitions between research foci or search for the inconsistencies between networks of ideas (defined on citations), and social (co-authorship) networks. Presented analysis is performed on complete Web of Science bibliographies of all Slovenian researchers with Slovenian research agency ID.

Do Your Friends Really Have More Friends than You Do? The Paradox of the Paradox of Friends

Vineet Kumar (Yale University), David Krackhardt (Carnegie Mellon University), Scott Feld (Purdue University)

The Paradox of Friends states that, on average, “your friends have more friends than you do.” Moreover, it has been shown that, as long as there is some variance in the number of friends in the network, this strong claim is true for any and all possible networks. However, we demonstrate that this paradox leads to a second inescapable paradox: We show structures where the average number of friends of friends is greater than the average number of friends that people have even though every single individual in the network has exactly the same number of friends that each of their friends has. We resolve this meta-paradox by providing two distinct ways of framing the problem: a “Local” perspective and a “Global” perspective, each of which results in a substantially different calculation of the mean number of friends of friends. However, we prove that the Local and the Global mean number of friends of friends are both always greater than or equal to the mean number of friends that people have in any and all networks, preserving the character of the original Friendship Paradox. Further, we show that the sign of a simple local parameter (we term “inversity”) determines whether the Global or the Local mean number of friends of friends will dominate in any particular network. We then demonstrate how different intervention strategies can take advantage of either the Global mean or the Local mean (but not both). Finally, we provide evidence from some classic networks that these two strategic approaches can yield substantially different payoffs, depending on the value of this inversity parameter.

Mapping accountability relationships between citizens and state actors in the water sector in rural Uganda: Insights from Social Network Analysis

Miet Kuppens (Institute of Development Policy and Management (University of Antwerp, Belgium))

This paper maps and analyzes accountability relationships between citizens and state actors in rural Ugandan villages using social network analysis. Increasing pressure on governments to demonstrate accountability and transparency has contributed to a multiplication of social accountability initiatives that aim to improve public accountability by strengthening civic engagement and good governance through a myriad of tools such as citizen monitoring or SMS-based complaint systems. In order to better understand why some interventions fail while others succeed, Jonathan Fox recently introduced the conceptual distinction between tactical and strategic social accountability. Tactical social accountability initiatives are bounded in time and scope, and focus merely on strengthening citizen voice locally while strategic social accountability initiatives go beyond the local arena and comprise of multiple coordinated, long term tactics that focus on both citizen voice as well as the capacity of the state to respond.

This study aims to assess whether the conceptual distinction between tactical and strategic accountability is reflected on the ground by mapping accountability relationships between citizens and local-level state actors (politicians and civil servants) related to the water sector in three rural Ugandan villages - a control village with no social accountability initiative, and two villages where either a tactical or strategic initiative is implemented. This results in one accountability network per village containing both state and non-state actors that interact in regard to public water-related issues. I use descriptive network measures such as degree, closeness, and betweenness centrality as well as brokerage in order to identify and compare key network characteristics in the three villages. I hypothesize that the accountability

networks in the village with the strategic accountability initiative includes more (and especially higher-ranked) state and non-state actors, and that the closeness between citizens and (higher-ranked) state actors is greater compared to the accountability network in the village with a tactical accountability initiative and the control village respectively. Furthermore I discuss the different actors in the three networks that take on the brokerage role between citizens on the one hand and state actors on the other.

The study is based on full network data; every community member in the three study sites were asked two network questions related to public water provision: who they share information with in regard to water-related issues and who they contact in case they want to find a solution to a water-related problem. Every local-level state actor responsible for public water supply in the three focal villages was asked the same two questions.

The co-evolution of work-related advice and voice networks

Ivan Kuznetsov (National Research University Higher School of Economics)

Effective communication will always be an integral part of successful organization. Expression of work-related ideas, helping newbies, advice giving - each of these examples/kind of OCB behavior leads to organizational benefits. But what is the difference between giving an advice and expressing your opinion? And how these networks co-evolve? Based on existing literature, we propose that both voice and advice networks are inter-dependent. In this study we investigate the co-evolution of work-related advice and voice networks, which contains both positive and negative voice types. First, the conceptualization of both voice types is made - negative voice is announced - a discretionary behavior of speaking up or information withdraw/???????? with intend to harm organization/unit/person, or to slow task completion. Second, co-evolution model of 3 networks (advice, positive, negative voice) is tested. The empirical value of the model is demonstrated by examining how each type of voice co-evolve with ????????????????? voice type and work-related advice network. Structural characteristics of each network are measured, transitive triplets, three-cycles and four-cycles are being analyzed. To empirically determine the impact of work-advice activity on both types of employee voice, we apply exponential random graph models for multilevel networks to relational data collected on mid-sized business organizations in Moscow, Russia. The research comprises of three observations of a complete organizational network, allowing longitudinal social network analyses.

Choosing a Beta Attenuation Value for the Political Independence Index

Joe Labianca (University of Kentucky), Jesse Fagan (University of Kentucky), Carlo J Labianca (University of Kentucky)

The Political Independence Index (PII) is designed to measure nodal positional power in signed graphs based on a dependence perspective. The analyst must specify a value for the beta attenuation parameter which, similar to the Bonacich power centrality measure, determines the decay rate of positive and negative ties as a function of distance to the focal node. This study focuses on providing analysts guidance on the choice of the beta parameter. We find that the choice of beta can lead to markedly different interpretations of positional power. We also find that differences in network structure impact the choice of beta. Based on the results of network simulations, we present diagnostics which aid the analyst in making an informed selection of beta when using PII.

A Comparative Analysis of Humanitarian Relief Networks after Two Natural Disasters

Chih-Hui Lai (Nanyang Technological University), Ying-Chia Hsu (National Chiao Tung University)

This study aims to investigate the questions of whether and how humanitarian network structures are manifested similarly or differently in different types of disasters. The first disaster under study is Cyclone Pam and the second disaster is Nepal Earthquake. As the second strongest tropical cyclone since Typhoon Haiyan, which hit the Philippines in November 2013, Cyclone Pam hit Vanuatu on March 12, 2015, causing 16 deaths and affecting more than 130,000 people across this island nation. In the capital of Port Vila, most of the buildings were severely damaged as a result of the storm. On April 25, 2015, a month after the cyclone, a 7.8-magnitude earthquake struck Nepal. It caused more than 9,000 deaths in Nepal, India, and China, but the majority of the casualties were in Nepal. As these two disasters happened less than two months apart, it is expected that international relief operations might exhibit similarity. Yet these two disasters represent different types of emergencies, with the cyclone giving residents time and opportunities for preparatory measures whereas the earthquake leaving people no warnings and unprepared.

To address these concerns, this study uses secondary data from United Nation Office for the Coordination of Humanitarian Affairs (OCHA), which records details about international relief activities involved in major natural disasters. In each disaster, we investigated the effects of endogenous structural factors (centralization, triadic closures, sharing of relief locations) and exogenous factors (homophily of organizations' headquartered locations and prior relief experience with Typhoon Haiyan) on the delivery of relief operations to the affected communities, which was measured through organizations' co-provision network of relief support. Exponential Random Graph Modeling (ERGM) was used as it allows the simultaneous examination of the effects of relational and attribute factors on the formation of networks.

The results showed that in these two disasters, humanitarian relief operations exhibited both similar and different patterns of network structures. Specifically, analysis of 57 humanitarian organizations' relief networks after Cyclone Pam revealed a closure structure where organizations were connected to one another by providing similar resource support to the communities. Despite the domination by a few central players, there was relatively even distribution of relief activities among peripheral organizations. Additionally, organizations' locations of relief operations across affected areas (i.e., islands of Vanuatu) predicted relief network structures. In other words, organizations sharing the same relief locations tended to provide similar relief support to the affected communities. Meanwhile, the results from the analysis of 411 humanitarian organizations involved in the relief operations of Nepal Earthquake showed less clear network structures in terms of centralization and clustering, but the influence of shared relief locations on relief operations was still observed. In both datasets, similarities in organizations' headquartered locations and prior relief experience with Typhoon Haiyan did not significantly predict the network structures of relief operations. In sum, this study presents important empirical and theoretical contributions in shedding light on the patterns of relief networks mobilized for disasters of different types. Findings also provide implications for uncovering disparities in international relief operations.

Social Integration in Friendship Networks and Adolescent Smoking: The Role of Ties Outside of School

Cynthia Lakon (UC Irvine), Rupa Jose (UC Irvine), John Hipp (UC Irvine), Cheng Wang (Cornell University), Carter Butts (UC Irvine)

The extent to which social integration within schools is protective or deleterious for adolescent smoking is not clear. Following past theoretical insights, studies have generally indicated that less socially integrated youth in school settings are more likely to smoke, with some key exceptions. Most studies typically focus on the friendship networks of youth within youths' schools, however a few studies have simultaneously considered the role of social ties outside the school in impacting smoking behavior. To address this question, the present study utilizes data from the first wave of the National Study of Adolescent to Adult Health and a multilevel modeling strategy to simultaneously examine how social ties within the school and social ties outside the school are related to adolescent smoking behavior. We also consider the role of salient individual level and school level network characteristics, and whether the relationship between the presence of ties outside the school and smoking is moderated by key socio-structural conditions. Implications for prevention will be discussed.

Measuring homophily in scientific collaboration networks: a new metric for disconnected networks and its application to the co-participation network of the 7th Framework Programme for Research and Technological Development (FP7) of the European Commission

Bastien St-Louis Lalonde (Science-Metrix), David Campbell (Science-Metrix), Guillaume Roberge (Science-Metrix), Grégoire Côté (Science-Metrix), Rémi Lavoie (Science-Metrix), Éric Archambault (Science-Metrix)

Homophily is a measure used in social network analysis to highlight the extent to which actors exhibit a preferential attachment to other actors sharing a common characteristic for some attribute (e.g., geographic location). Traditionally, homophily is calculated by comparing the average path length between actors sharing the same characteristic to the average path length between all actors in the network. However, datasets often contain isolated actors (or components consisting of small sets of connected actors) not tied to all others in the complete network. This was the case for the datasets considered in a network analysis Science-Metrix conducted for the European Commission. In this context, this definition of homophily is mostly useless because it becomes impossible to compute the average path length between disconnected actors. To overcome this limitation, a new homophilic metric was defined. It ranges

from -1 (highly heterophilic) to 1 (highly homophilic), with 0 representing a neutral network, which is a network in which the observed occurrences of homophilic (a tie between two actors sharing the same characteristic) and heterophilic (a tie between two actors with different characteristics) pairs are equal to their expected occurrences based on a random network of the same size (i.e., same number of actors and edges) with the same frequency distribution of actors across the observed characteristics of the attribute of interest.

This new metric was applied to a set of real world data representing the co-participation network of researchers funded under the European Commission's 7th Framework Programme for Research and Technological Development (FP7). Under FP7, a number of actions were implemented to boost innovation by promoting increased linkages between the public (i.e., academic and governmental sectors) and private sectors. In this context, it is highly relevant to investigate whether the FP7 network—relative to its predecessor under FP6—evolved towards a more heterophilic structure in regard to the clustering of actors (i.e., participating organizations) according to their sector (i.e., higher education, private, public body).

The global (all projects) sectoral homophily was found to decrease from FP6 to FP7, indicating that integration of sectors was promoted under FP7 (different sectors collaborated more together). As a result, one can hypothesize that innovative ideas under FP7 reached the private sector more easily, potentially boosting innovation and, in the long-term, the economic competitiveness of Europe. An extended analysis collating multiple sources of evidence (collaboration networks, surveys and interviews) confirmed that the presence of SMEs in FP7 projects significantly increased knowledge transfer from research to market as well as the propensity of projects to introduce innovation in the form of new products or processes. A finer analysis by specific funding mechanisms under FP7 highlighted the efficiency of the projects that were purposefully designed to achieve this goal.

Graph Theoretic Detection of Dark Networks in Background of Larger Social Networks

J.R. Lapidés (Network Science Center, West Point), Daniel Evans (Network Science Center, West Point)

The United States and its allies are facing an ever-increasing threat that emanates from dark networks. Dark networks are defined as networks that model groups which attempt to conceal themselves and their activities from others. Traditionally, this term has been used to describe the workings of groups such as drug cartels, terrorist groups, gangs, or violent non-state actors. A challenge that dark networks present is the fact that standard network analysis tools were developed to examine organizations that are more transparent and open to outside analysis. The inherently clandestine nature of dark networks presents challenges to the user of conventional network analysis methods. Data used to develop dark network models tends to be incomplete, ambiguous, and subject to error. Because of these qualities, it is important to understand the developed network's sensitivity to error. With a better understanding of this potential error, military analysts and target developers will drastically improve their effectiveness.

Our team from the Network Science Center, West Point is developing an innovative graph theoretical framework for exploring the detectability of dark networks within larger social networks. Nodes corresponding to people will be represented as sets of quantified attributes. We have developed parameterized edge models of personal relationships that are multivalued functions of the node attributes. Additionally, we will describe iterative schemes for using general a priori information about human behavior, relationships and organization topology to fill in missing data or to correct likely errors. The work emphasizes evaluating the likelihood that a dark network exists rather than the chances that a particular individual is in the network or not. Consequently, the overall model tries to examine not only whether static relationships are present but whether the detected network has the requisite dynamic capability to function operationally by transmitting orders, transacting necessary business activities, and performing operations.

This presentation will introduce our initial framework and describe our initial data simulation and correction efforts. Additionally, we will present our initial results and findings.

A social network comparison of African American MSM who frequently use the internet to seek sexual partners with those who seldom or never use the internet for partner selection

Carl Latkin (Johns Hopkins School of Public Health), Karin Tobin (Johns Hopkins School of Public Health)

African American men who have sex with men (MSM) in the US have exceedingly high rates of HIV. We were interested in examining the personal networks of African American MSM and assessing how mode of partner selection may be associated with other social network factors. Specifically we examined how finding partners on the internet

may be associated with social network factors. There were 391 participants who enrolled in a network oriented intervention in Baltimore, Maryland and completed a network inventory between October 2012 and April 2015. At baseline, 62% reported having a high school education or less, 59% were unemployed, 42% were HIV seropositive, 75% reported 2 or more sex partners in the prior 3 months, and 49% used the internet 2 times a week or more to seek partners; whereas 26% reported never using the internet to look for partners. In a comparison between frequent and infrequent users of the internet to seek sexual partners many differences in network sizes and proportions were observed. To control for overall network size we employed multiple logistic regression and first entered age and total network size. Even after adjusting for total network size and age, participants who tended to use the internet to find partners reported statistically significantly greater number of network members who had a 9 to 5 job and more non kin network members who knew about their MSM status. There was also a statistically marginal association with number of kin network members who knew about their MSM status, and participants who seldom or never used the internet to find partners reported that they were more financially dependent on their social network members. These results suggest that African American MSM with more network resources and greater disclosure of MSM status are more likely to use the internet to find partners. These findings can help direct HIV prevention and care programs for African American MSM.

Increasing Referrals for Cancer Screenings Among Uninsured Populations in New York State: Training Public Health Practitioners to Use Organizational Social Capital

Jennie Law (University at Albany-SUNY), Ellen Bradt (New York State Department of Health), Dara Shapiro (New York State Department of Health)

Research Objective: Strategic partnerships between community-based organizations, government agencies, and clinical providers have the potential to increase the effectiveness of public health initiatives and improve population health. However, changing healthcare environments may also change the effectiveness of organizational partnerships. This study examines how the Cancer Services Program (CSP), a New York State (NYS) Department of Health program supporting breast, cervical, and colorectal cancer screening services to low-income, uninsured men and women, ages 40-64 years, uses organizational social capital, a type of social currency, to establish community partnerships that support the provision of cancer screenings to uninsured populations.

Study Design: Fifty-two semi-structured interviews were conducted with CSP contractors and administrators serving every county in NYS. Study participants were asked about (1) types of collaborations their organizations engage in, (2) organizational collaborations that result in the most referrals of uninsured populations to the cancer screening program, and (3) changes in organizational partnership strategies since the state's Medicaid expansion. Interview findings were used to develop a practitioner oriented training tailored for CSP program coordinators and outreach specialists. Trainings were approximately 60 minutes in length and introduced the components of organizational social capital. In groups participants identified the key activities their organizations engage in to generate, sustain, and use social capital. Participants also discussed barriers and opportunities to connecting with different types of organizational partners. The trainings elicited feedback from the participants about the activities they engage in to generate, sustain, and use social capital. Participants evaluated the usefulness of the training on a five point Likert scale.

Population Studied: Training recipients (N=66) were representatives of the CSPs including program coordinators and outreach specialists.

Principal Findings: Data generated by the training indicates that most participants are comfortable identifying concrete ways of generating social capital, but have difficulty articulating which specific activities sustain social capital over time. Additionally, we find that the CSPs have difficulty conceptualizing how to leverage organizational social capital beyond "quid pro quo" or tit for tat interactions. CSPs report that the trainings were useful (mean score: 4) in providing new ways to achieve organizational goals.

Conclusions: CSPs have difficulty developing resilient organizational partnerships that will enhance their mission to provide cancer screenings to uninsured populations. This is because of difficulties sustaining relationships over time and using accumulated social capital. This makes it more difficult for CSPs to engage with partners who are likely to refer uninsured clients to the program. However trainings on building, sustaining, and using organizational social capital are helpful to conceptualize the activities that result in meaningful organizational partnerships.

Implications: The development of additional practitioner trainings that use a social capital framework to develop skills related to sustaining relationships over time and using social capital to obtain organizational goals may enhance the capacity of CSP partner networks to reach their service population. Understanding which specific key activities build and sustain organizational social capital may inform the development of future interventions which may also be applicable to areas beyond cancer screening related to public health service delivery.

Modeling information sharing networks in community change efforts

Jennifer Lawlor (Michigan State University), Zachary Neal (Michigan State University)

Many communities are addressing complex problems using approaches like collective impact, systemic action research, and network action research (referred to here as networked community change). These approaches suggest shifting the patterns of relationships among participating stakeholders as a means of more efficiently achieving desired outcomes. While networked community change approaches have quickly achieved popularity, there is very limited research regarding the social networks that emerge among stakeholders implementing them. This project employs agent-based modeling and social network analysis to examine the extent to which these networks are efficient. I compare two models: an ideal, theory-based model, and a refined model that incorporates common challenges that emerge in practice. (The refined model is based on a qualitative analysis of the challenges discussed in published accounts of networked community change efforts in practice, including issues like stakeholder turnover and power dynamics.) In both models, agents follow the behavioral guidelines dictated by theoretical change approaches for building information-sharing ties with each other, using small worldliness as an outcome measure of network efficiency. In this presentation, I will discuss findings regarding the nature of networks in community change efforts employing networked approaches as well as implications for improving or intervening on existing networks to increase efficiency, particularly under challenging conditions.

Synchronization costs in the dynamics of multilevel networks

Emmanuel Lazega (Institut d'Etudes Politiques de Paris & CSO-CNRS)

This presentation provides a theoretical framework for the sociological study of the dynamics of multilevel networks. Multilevel structures are defined as different but interdependent superposed levels of organized collective agency evolving each at their own rhythms and raising issues of costs of synchronization between the temporalities of these different levels. The notion of cost of synchronization is proposed to account for the efforts spent by actors at each level to structure the other level so as to reshape their constraints and opportunities and thus redefine the terms of this synchronization of temporalities. The main cost of interest with respect to these efforts is defined in terms of creation or maintenance of intermediary level substructures providing leverage for actors involved in such 'cross-level' structuration. Empirical examples are provided following the 'multilevel spinning top model' of synchronization as well as implications for the study of the emergence of corporate entities, institutions, and social inequalities.

Risk on The Margin: The Structure of Covert Social Networks

Byungkyu Lee (Columbia University), Peter Bearman (columbia university), Eun Shin (columbia university)

In contexts where states seek to break apart terrorist networks, leaders and other core members of such covert organizations need to be well insulated from risks arising from ties to other activists. The greatest threat to such organizations is an "identification cascade", a process triggered by one or more members revealing the identity of others within the movement. To reduce the risk of such cascades, terrorist organizations minimize ties between members, reduce risk of capture for core members, and drive such risk to the periphery, whose members are largely unaware of the core that directs the movement. At the same time, leaders and other core members of the group (if they are to achieve coordinated action) need to retain ties to others in the movement whose activity they can direct. If their structure is too fragile such that it breaks into disjoint components on node deletion, terrorist organizations lose the capacity to act cohesively. Some element of centralized control is thus necessary.

In this paper we show using a simulation model how simple decision rules governing tie formation and tie dissolution for actors engaged in building a clandestine organization across diverse contexts (defined by the extent of state repression) can induce an ideal covert network structure. This structure is one in which the core is insulated and risk of detection is driven to the periphery. We show that an ideal clandestine network can be induced if actors who emerge

as core to the movement select alters on the basis of inverse homophily while non-core terrorists (or criminals) select alters homophilously on degree. We then simulate the effects of arrest and interrogation leading to identification of other activists. We induce measures of risk at the individual and collective level and show why the ideal covert network is more robust than other structural forms. We then compare result from our simulation with detailed observed empirical data (capturing associations within a clandestine organization) arising from a reconstruction of the Provisional Government of Korea (PGK), a covert political organization that fought against Japanese colonialism from 1919 to 1945.

Personal Network Structure and Post-Disaster Recovery Experiences in Tornado-Affected Communities

Seungyeon Lee (Purdue University), Arif Sadri (Purdue University), Satish Ukkusuri (Purdue University), Rosalee Clawson (Purdue University)

In line with the increasing emphasis on the role of community members in disaster response, recovery, and resilience, this study examines the structure of social networks surrounding households in disaster contexts. Survey data were collected from 392 households in four cities from southern Indiana in the U.S. that were impacted by tornadoes in March of 2012. Questions asked about households' post-disaster experiences including the people they have closely interacted with during evacuation and recovery. Taking an ego-centric network approach, this study examines the structural characteristics of personal networks based on the nature of ego-alter ties (e.g., geographic distance, relationship duration, relationship type, and type of help received), alter-alter ties, and the socio-demographic composition of alters. In addition, we ask two key questions: (a) How does the structure of households' social connections such as network size, density, heterogeneity, and homophily influence post-disaster recovery experiences? and (b) What predicts the structure of households' social ties mobilized during recovery? This study provides theoretical implications about the network structure of social support and social capital as well as practical implications about community-oriented coordination in disaster recovery and resilience.

Influence and Selection in Adolescent Sexual Experiences: Modeling Differential Sexual Homophily by Same- and Cross-Gender Friendships

Jaemin Lee (Duke University), Sarah Trinh (University of North Carolina at Chapel Hill), Carolyn Halpern (University of North Carolina at Chapel Hill), James Moody (Duke University)

Adolescents are generally not privy to their friends' actual sexual experiences, yet similarities between adolescents' and their friends' sexual behaviors have been documented (e.g., Coley, Lombardi, Lynch, Mahalik, & Sims, 2013). It is unclear how such similarities arise and whether these similarities persist over time. Having like-minded and similarly experienced friends may provide support for adolescents, especially for those who do not conform to dominant sexual norms and expectations, and as a result, may face ridicule from their peers at large (Lyons, Giordano, Manning, & Longmore, 2011). Friendship networks may serve as sites of sexual socialization whereby adolescents' collective actions in informing, supporting, and policing sexual activities may lead to adolescents and their friends having similar sexual experiences. How do adolescents' sexual experiences and friendship making processes co-evolve?

Our main argument is that, given that sexual norms are very gendered (i.e., boys are expected to be sexually experienced and insatiable and girls are not), adolescents may hold different expectations for girls and boys and consequently select and socialize their same- and other-sex friends differently. Applying stochastic actor-based oriented models to data from the National Longitudinal Study of Adolescent to Adult Health (Add Health), we model sexual homophily differentiated by same- and cross-gender friendships. Our results indicate that 1) sexual experiences are greatly shaped by friends' influences and play a key factor in adolescent friendship selection and that 2) the selection effects based on sexual experiences are significantly stronger in same-sex relations than cross-sex relations. These findings call for an approach that explicitly considers the gendered nature of behavioral homophily. We discuss broader implications with respect to the network dynamics literature that has largely neglected complexity in gendered communication channels and to the adolescence research that, at best, has only focused on the individual-level gender differences in sexual experiences.

Multiplexity in personal network of the late middle age.

Keunbok Lee (UC Berkeley)

This study examines the late middle age's social network multiplexity using the 467 respondents and 2,185 ties drawn from the UCnet survey data. By getting old, people are likely to live apart from their kin due to moving out adult children and geographical dispersion of kin, lose contact with old friends, and meet a new person. Given the change of social relationship by aging, a question is how people meet their social needs such as socializing, and exchanging help. This study addresses whether individuals compartmentalize their social relationships for satisfying specific social needs or rely on a small group of alters who interact with them in diverse ways. Using the multilevel latent class method which can take account of the qualitative dimension and hierarchical structure of multiplexity in personal network, I found four sub-clusters of alters based upon whether they were mentioned in social exchanging questions and two distinctive subgroups of respondents according to the distribution of four alter's sub-clusters. The statistical analysis of this study is three-steps; in the first step is to cluster alters based upon whether they were mentioned in six different social activities (socializing, providing practical help, providing help when ego was sick, getting help from ego, discussing ego's personal concerns, and advising). Using the clusters of alters from the first step, the second step is to figure out sub-groups of respondents based on the distribution of clusters of alters. In the last step, I conducted multilevel multinomial regression model through which I examined the effects of tie level and respondent level covariates on the membership of alter's sub-clusters and ego's subgroup. From the first step, I found four distinctive subgroups of alters. The first group is the 'alters for socializing and help-out' (46.23%), the second is the 'confider/adviser' (25.24%), the third is the 'multiplex alters' (21.58%), and fourth is the 'helpers/socializing' (7.05%). And two distinctive respondents' subgroups were found based on the distribution of each alter's sub-cluster. The first respondents' group can be labeled as 'separator' group (71.1%). The majority of alters' subgroups in the 'separator' group is the 'alters for socializing and help-out' (51.5%) and the second largest is the 'confider/adviser' (31%). Half of alters in the second respondent sub-group belong to the 'multiplex alter' group (50.5%). I labeled this respondent sub-group as the 'multiplexer' (28.91%). In the alter level analysis, emotionally closed and same-sex alters are likely to belong to the 'multiplex alter' cluster, and spouse or romantic partner are more likely than other relationship to be assigned in the 'multiplex alter' cluster. The 'separator' and the 'multiplexer' groups in respondent level are distinctive in tenure in neighborhood and retirement status. Longer residence in a neighborhood increase possibility to belong to the 'multiplexer' group and retired people are likely to be assigned in the 'separator' group. Given the change of several aspects of social relationship by aging, I found that old people manage their social relationship in a two different ways in order to meet their social needs; compartmentalizing relationship vs. cultivating multiplex alters.

Mutual Assent or Unilateral Nomination? A Performance Comparison of Intersection and Union Rules for Integrating Self-reports of Social Relationships

Francis Lee (University of California, Irvine), Carter T. Butts (University of California, Irvine)

Network inference is the problem of inferring an unknown graph from a set of error and/or missingness-prone observations (Butts, 2003). This problem is of fundamental importance in the study of social networks, where relationships between individuals, organizations, or other entities must typically be inferred from self or proxy reports, documents, or other imperfect source of information. Arguably, the most basic and familiar example of the network inference problem arises when attempting to integrate self-reports from subjects, each of whom is asked to identify all others with whom he or she has a particular relationship (or, in the case of a directed relationship, all others to/from whom he or she respectively sends and/or receives ties). Such data has been widely collected (see, e.g. Drabek et al., 1981; Wellman, 1971; Killworth and Sailer, 1979; Pattison et al., 2000), and poses a basic challenge for the analyst: given two reports on the state of a given relationship, what is to be done when the subjects disagree? Krackhardt (1987) famously formalized two basic strategies for the analysis of such data (leading to respective estimators of the underlying network): regard an edge as present if either party reports it (the union rule); or regard an edge as present if and only if both parties report it (the intersection rule). While one or another rule has in some cases been argued to be preferred on substantive grounds, there has been little systematic investigation of how the rules perform on empirical data, and in particular on the relative performance of these rules in inferring network structure under realistic conditions. This paper seeks to address this gap, employing interpersonal networks whose complete structures can be well-estimated through hierarchical Bayesian models (Butts, 2003) to assess the accuracy of these simpler (but more widely applicable) rules. Our findings demonstrate that the intersection rule (mutual assent') generally outperforms the union rule (unilateral nomination") for the networks studied here - a surprising result, given that our informants are more prone to false negatives than false positives. We resolve this discrepancy by showing that the sparsity of the network is key to the performance of the two rules, with the intersection rule dominating

the union rule for networks in which the opportunities for false positives greatly outweigh the opportunities for false negatives.

The framework and a new tool for evolutionary Game Theory on Networks

William Leibzon (University of California, Irvine)

This presentation describes a general framework for modeling human interaction and group decision making on a network using probability models and game theory based individual interactions. The framework describes beliefs and strategies as probability distributions over sets of acts and extends these using evolutionary game theory and cognitive decision theory to model updates of strategies on a network. A new tool based on Gephi is introduced to do such game-theory based models as simulations on complex networks and results presented for several simple models involving diffusion and information transmission.

This presentation should go under Game Theory sessions at Sunbelt. If game theory sessions are not organized then Network Dynamics.

The “Majority Illusion” in Social Networks

Kristina Lerman (University of Southern California), Xiaoran Yan (ISI-USC), Xin-Zeng Wu (USC)

Individual's decisions, from what product to buy to whether to engage in risky behavior, often depend on the choices, behaviors, or states of other people. Individuals, however, rarely have global knowledge of the states of others, but must estimate them from the local observations of their peers. Network structure can significantly distort individual's local observations. We show that under some conditions, a state that is globally rare in a network may be dramatically over-represented in the local neighborhoods of many individuals. This effect, which we call the “majority illusion,” leads individuals to systematically overestimate the prevalence of that state among their peers, potentially affecting collective phenomena and accelerating the spread of social contagions. We develop a statistical model that quantifies this effect and clarifies its dependence on network structure. We validate the model with measurements in synthetic and real-world networks.

NETWORK AND ACTOR ATTRIBUTE EFFECTS ON PERFORMANCE OF RESEARCHERS IN TWO FIELDS OF SOCIAL SCIENCE

Srebrenka Letina (The Institute for Social Research in Zagreb)

The methodology and theories developed in social network research encouraged numerous research, and enhanced hypotheses, about the effect of scientific collaboration on the individual scientific performance. Previous research used many different measures for description of the scientist's position in the network, to determine its association with his performance. Although, as shown in other contexts, the individual performance is not only the result of the structural position, the attributes of the actor were often ignored. The aim of the study is to explore the network and actor attribute effects on the scientist's performance. By employing the auto-logistic actor attribute models, the extension of exponential random graph models, it is possible to include actor attributes and analyse their effects simultaneously with network effects. This study analyses the scientists in two fields of social sciences (psychology and sociology) in Croatia. Based on publication data from 1992 to 2012, extracted from two international (Web of Science, Scopus) and one national source (National University Library), the co-authorship network for the 1992-2001 period is constructed. Nine structural effects are specified: Density, Activity, Contagion, Ego-2Star, Alter-2Star1, Alter-2Star2, T1, T2 and T3, together with five actor attributes: gender, location, institution type, age and previous productivity, to predict individual performance measured by the number of published papers of a scientist in the 2002-2012 period. Results show that being in the 50% of the most productive scientists in the 2002-2012 period is dependent upon the co-authorship network in the 1992-2001 period. Different structural parameters are important predictors and their effect on future performance is different for the two examined fields. Being connected with others is not by itself related with higher future productivity. In psychology, being in a closed structure is negatively related with the probability of the outcome - being above median in productivity. In sociology, being active in the network is

a negative predictor, while having a tie with an actor with the attribute - above average future productivity, is positive. Previous productivity and institution type, in both fields, and age, only in sociology are significant actor attribute effects. There are two opposite views on optimal ego-net structure regarding how it generates social capital of an individual, often represented by Burt's structural hole and Coleman's social closure theory, with the main difference being whether the presence or absence of ties among alters in an ego-net is optimal for an ego. To provide some insight on this issue, log-odds are used to examine the change in the probability of the outcome for three prototypical ego-net structures: open, closed and complex. Results suggest the optimal ego-net structure for future productivity is different for two examined fields and varies according to the presence of attribute in alters (being among 50% of the most productive in the field). The robustness of the models is checked with a different but related dependent variable - H-index of a scientist. Results are interpreted in the light of specific disciplinary cultures in a small and peripheral scientific community and some directions for future research are identified.

Communications Patterns, Team Effectiveness, and Collaboration in a 3-Week Learning Game

Alice Leung (BBN Technologies), Ethan Mollick (University of Pennsylvania, Wharton School), William Ferguson (BBN Technologies), Lisa Scott (Army Research Laboratory)

What dynamics make a team succeed, and what role in these team dynamics earn an individual the respect of teammates? We compared the outcomes of team achievement and individual peer ratings of 80 students assigned to 13 teams in a 3-week long, interactive, immersive, learning game. The focus of the game, steering a technology start-up company to success, incorporated elements of information uncertainty and incompleteness, emerging leadership, evolving trust, time pressure, and conflicting goals. Each team was presented with the same initial situation and asked for the same set of deliverables, but participant interactions with each other and with a set of non-player characters (NPCs) resulted in varying team performance. We studied the online chat and email interactions comprising the full interaction record for each team to develop quantitative and qualitative characterizations of successful teams and individuals.

Mental Models in a Knowledge Network

Michael Levy (University of California, Davis), Mark Lubell (University of California, Davis)

Agriculture faces a daunting challenge: To feed a growing population in the face of declining natural resources and increasing concern for environmental externalities. Calls for "sustainable agriculture" are widespread, but that phrase can be ambiguous and the systems involved in sustainable agriculture are diverse and have complex interdependencies (ecological, economic, political, etc.). At the same time, the dynamics of agricultural knowledge diffusion are undergoing a transformation, from a more rigid and hierarchical system to a distributed network of specialized expertise. This project provides a detailed examination of how understanding of a system varies across a network of domain experts. To better understand how experts understand sustainable agriculture and the relationship between that understanding and social network variables, we assembled panels of agriculture experts from around California and elicited their mental models of sustainable agriculture. Mental models are network representations of a system in which nodes represent components of the system (concepts) and edges represent causal links. The experts constructed models with concepts in their own words, so to compare the content of models, semantic analysis was necessary. Concepts were often complex phrases, so to assess the similarity of concepts we developed an algorithm that leverages the text of Google search results for each concept. We then applied hierarchical clustering to reduce the thousands of unique concepts from the mental models into 41. With the experts' models then consisting of the same set of concepts, we examined how concepts and the relationships among them varied among individuals and across regions and professions, and we also constructed an aggregate model of sustainable agriculture that represents the sum of understanding of all of the experts. Preliminary analyses indicate that while farm-management practices occupy the bulk of concepts in the models, they tend to be peripheral and variable across individuals. In contrast, goals for sustainable agriculture are less abundant but are more widely shared and occupy central positions in the models. Looking at the network structure of the models, experts who have worked in agriculture longer or have more education tend to have larger and more centralized, but not denser, models. Models from experts in government or nonprofit organizations have more modular models than experts in academia or industry. A survey including social network questions is currently (January 2016) in the field, and ongoing work will relate experts' positions in the knowledge network to the content and structure of their mental models.

Adolescents' multidimensional homophily in classroom friendship and Facebook networks: a study of social network analysis

Shupin Li (University of Turku)

Socio-digital technologies have blurred the boundaries of adolescents' offline and online social networks. Present paper aimed to examine gender and cultural multidimensional homophily of classroom friendship offline and online (Facebook) among grade 7-9 adolescents (age: $M=14.94$, $SD=1.00$) from 6 classrooms in a multi-cultural school in Finland. The participants' ($N=109$, responded rate was 85.16%) gender and cultural homogenous patterns of friendship in classroom were examined by social networking questionnaire (offline and online relations). Exponential random graph models (ERGMs) included gender and cultural homophily as well as their interaction effect were produced in R statnet package for each classroom network. Techniques of meta-analysis were then applied to these models to extract findings across classrooms in friendship network and Facebook network respectively. The results showed that gender homophily was found only in friendship networks while cultural homophily was not concluded on both friendship and Facebook networks within classroom. It indicated that adolescents in present sample appeared to network with peers of same gender in classroom and their interaction was not based on their cultural backgrounds. Further, there was not interaction effect between gender and cultural homophily meaning that gender and culture might not be combined attributes that affect adolescents' friendship and Facebook networking with classmates.

An Emic View of Coupon Passing Decision Making and Reality in Respondent Driven Sampling (RDS)

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RDS has been widely applied in HIV research, surveillance and other public health research for its efficiency in reaching hidden populations as well as claimed capacity in generating unbiased population estimates via recruited sample. The validity of RDS estimates depends on many key assumptions, which include accurate reporting of network size as well as random selection of participants by the respondents. Unfortunately, there is a lack of empirical evidence that many assumptions on which RDS estimates are valid and hold place in real world applications. Development of RDS methodology was initially pressed by the challenges that researchers have little knowledge of the hidden population. For many years peer recruitment process has been a black box mostly operated by study participants and their recruitment contacts. Our team conducted a comprehensive and in-depth social network study of social network structure and peer recruitment dynamics as RDS implemented among injection drug users (IDUs) in Hartford, Connecticut. With the team's extensive knowledge of the study population and intensive network data collected from 526 study participants, we are able to construct a sociometric network dataset of 2717 IDUs as population proximity to assess RDS model assumptions. In addition, we conceptualize a complete peer recruitment as a five step process: planning (select recruit candidates from known IDU alter list); seeking and outreaching selected candidates; candidate take coupon from recruiter; unexpected IDU receive coupon; coupon receiver enroll in the study. Intensive network data regarding recruitment plan and reality were collected before receive coupons and after peer recruitment completed 2-month later. Sixty in-depth interviews were conducted to elicit detail illustration of actual experience and interpretation behind it. This paper adopts an emic perspective of study participants to reveal decision making process of coupon distribution from the viewpoint of the participants and to focus on coupon distribution dynamics on the street. We will present quantitative and qualitative data analysis results that answer the following questions: At planning stage, how recruiter decide who would be good candidates to recruit? During implementation, to what degree and in what way peer recruitment attempts deviate from initial intention? What factors are associated with recruitment plan deviation and unplanned actions? What factors are associated with successful coupon passing and enrollment in study? Does recruit attempt, coupon passing and return pattern change over time as study sample recruit approaching to later stage? Our results indicate that the process of selection is not-random, and the non-random patterns are different at different stages of recruitment process. Implication of RDS random selection assumption violation will be discussed in the context of understanding existing RDS estimate validity and potential ways for improvement.

Social influence on 5-year survival in a longitudinal chemotherapy ward co-presence network

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Chemotherapy, a biological therapeutic for cancer, is often administered in openly-designed hospital wards where patients can observe and interact with one another. This setting opens patients up to the possibility of social influence on their health. Although previous research has found evidence for social influence and communal coping of chemotherapy patients at home and in cancer support groups, social influence has not been examined in patients while in the chemotherapy ward. Using data on 4,691 chemotherapy patients in Oxfordshire, UK, we construct a network of patients who are co-present more than expected by chance ($p < 0.01$) in the ward based on the empirical distribution of patient overlap times. We estimate the effect of social influence by counting the number of times a focal patient's immediate neighbors or those two steps away finish their chemotherapy cycle and either survive 5 years or die within 5 years (Separate counts for survival and death). These counts, along with an indicator for whether the patient is an isolate, and the control variables of age, sex, cancer severity, the patient's number of ward visits for chemotherapy, and the total length of the chemotherapy cycle, are entered into a Generalized Estimating Equation modelling the likelihood of dying within 5 years for the focal patient on the log scale. Our study population has an average age of 60 years ($SD=13$), of whom 2,094 (45%) are male. The co-presence network has 4,691 nodes and 13,459 edges, for a density of 0.0012. There are 2,321 isolates, and the median degree of non-isolates is 4 (IQR: 2,10). We find that being older and being male are associated with higher log-likelihood of death. Being an isolate also increases the log-likelihood of death (0.402 CI: 0.247,0.558). Each patient previously finishing chemotherapy and surviving 5 years who is directly connected to the focal patient changes the focal patient's log-likelihood of death by -0.095 (CI: -0.145,-0.045), while those previously finishing chemotherapy and dying within 5 years changes the focal patient's log-likelihood of death by 0.067 (CI: 0.034,0.100). We observe no significant influence effect for alters two steps from the focal actor. We therefore conclude that there is evidence that social influence occurs in chemotherapy wards, and that this influence takes both positive and negative effects, which may need to be taken into account when scheduling chemotherapy.

Social Capital, Islam, and Labor Force Outcomes: What Explains Labor Force Outcomes among Muslim Immigrants?

Chang Z. Lin (University of Toronto)

The strengths of weak ties have been well documented - they tend to offer more novel information, and therefore are more likely to lead to job opportunities (Granovatter 1973). Immigrants who develop this kind of ties with the native-borns in the host countries tend to do well in the labor market because these ties are valuable in offering information otherwise inaccessible to them. In fact, many have found that immigrants with ties to others outside of their ethnic group tend to find better jobs (Bridges and Villemez 1986)), and do so more quickly (Portes 1995) than do those who have few or no ethnically heterophilous ties. However, it would be naive to think this pattern of social capital leading to upward mobility is consistently observed among different groups of immigrants in different host countries. This paper focuses on the labor force experience of Muslims immigrants, whom have experienced increasing discrimination since the turn of the century, and analyzes the effects of social capital on various aspects of labor force outcomes in comparison to their native-born counterparts in Canada and France. More specifically, I ask the following research questions: o Does social capital lead to jobs in the primary labor market (i.e., the good jobs)? o Does social capital networks lead to higher salaries controlling for job types? o Does social capital moderate the effects of being Muslim on labor force outcomes? o Does the relationship between social capital, being Muslim, and labor force outcomes vary between Canada and France?

I analyze the Ethnic Diversity Survey (EDS) in Canada and Trajectoires et Origines (TEO) in France to understand the effects of social capital on Muslim immigrants' labor market outcomes. Social capital is measured using: 1) the ethnic composition of respondents' personal networks; 2) and participation in voluntary associations the members of which are not ethnically homophilous as the respondents. Controlling for measures of human capital such as education, I test the relationship among network diversity, voluntary association participation, means of obtaining current employment, and earnings.

This paper makes three unique contributions. First, it moves beyond merely identifying sources of job-related information to more tangible outcomes such as the type of job obtained, and whether they are better compensated

because they obtained the job using network connections (Bian and Huang 2015). Second, it directly tests whether Muslim immigrants are equally able to take advantage of the positive effects of social capital on labor force outcomes. Finally, it furthers our theorizing of the Muslim effect by offering a comparative study of Canada and France, the Muslim immigrant populations of which are drastically different. We show differences in the interrelationship among social capital, being Muslim, and labor force outcomes in the two host countries.

Embodied Cognition Embedded in Semantic Feature Networks: A Multi-Language Analysis for Chinese, English, German and Italian

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This study was to mine the evidences of embodied cognition in semantic feature norms. Firstly, it designed a classification scheme for Chinese semantic features on the purpose of establishing a set of empirical Chinese semantic feature norms. By following this framework, the Chinese semantic feature norms were established for a set of living and non-living things. By using datasets of Chinese meta-language (LI Baojia. Beijing World Publishing Corporation. 2013) and the empirical semantic feature norms, quantitative indexes were calculated for each feature, including distinctiveness, cue validity, dominance, priority, relevance, accessibility and significance. The study established two types of networks according to Feng LIN et al (Journal of Complex Networks, 2015: cnv026). The type I networks were 2-mode networks of concepts and features. The type II networks were semantic feature networks with features as vertices and concept-sharing relations as edges. To compare with the Chinese semantic feature networks, a series of type II networks were constructed and analyzed for the feature norms of English, German and Italian, respectively. Based on these analyses, this study explored cross-culture differences about embodied cognitive properties of semantic feature norming tasks. It also explored four patterns of heterogeneity (Estrada index and degree distribution), small-world, degree mixing and modularity in the network structures of semantic features. The degree distributions of type II semantic feature networks showed more likely lognormal distributions. Their Estrada indexes suggested homogenous pattern. However, all of these networks showed intrinsic small world structures. There were also intrinsic degree assortativeness and modularity in these networks. The influences of these patterns on the efficiency and robustness of semantic feature networks were discussed in this paper. To support the discussions about embodied cognitive clues embedded in the semantic feature norms, two Chinese agnosia patients participated in the second stage study. A set of pathological semantic feature norms were established. By comparing the healthy and pathological semantic feature networks, and by comparing different components that extracted from the feature networks according to cognitive modules, this study supported the Chinese meta-language theory that semantic features are anchoring junctions among cognition, semantic and syntax. Finally, this report discussed the application of semantic feature norms in speech language therapy.

Subnetworks and Music Scenes: An Application of Generalized Two-Mode Cores

Benjamin Lind (National Research University-Higher School of Economics), Stanislav Moiseev (National Research University-Higher School of Economics)

Recent methodological advances have enabled researchers to directly identify important subnetworks within two-mode networks using local properties. These advances most notably include the introduction of generalized two-mode cores, which synthesizes the concepts of (p-q)-cores and generalized cores in a one-mode network context (Cerinsek and Batagelj 2015). Despite the widespread utility in using local properties to directly infer significant two-mode subnetworks, few empirical studies have applied this technique. For the study at hand, we use this method to examine the emergence of significant subnetworks within the context of large-scale, music collaboration networks. We identify the emergence of such influential subnetworks over time by analyzing different combinatorial pairings of local properties as applied to each of the two node subsets. We evaluate the findings from these analyses against those influential individuals, projects, and collectives identified from narrative historical accounts. Beyond an empirical demonstration of the method, implications from our study highlight the local mechanisms by which particular subnetworks acquire influential positions within their global networks.

Empirically Calibrated Simulation Experiment of Non-Medical Vaccine Exemptions and Disease Outbreak Potential in California

Kayuet Liu (UCLA)

Background. An increasing number of children are entering U.S. kindergartens and childcare centers without having received state-mandated vaccination. It is primarily due to the rise of “non-medical exemptions” (NMEs) from school vaccination requirements—exemptions that are based philosophical/religious rather than medical reasons. NMEs tend to cluster spatially and create pockets of low immunization. Previous simulations studies show that such pockets increase the chance of outbreaks (Eames 2009; Salathe and Bonhoeffer 2008). Previous work has looked into the effects of network characteristics (e.g., influence process, small world vs random network, and different networks for influence and infection transmission). Yet the effects of the actual spatial distributions of NMEs have not been considered. **Methods.** This study calibrates the model with the actual distribution of NMEs in California. A synthetic population of 3 million children is constructed based on block-level census data from 2010. The synthetic population contains fine-grained details of socio-demographic characteristics, including age, race/ethnicity, sibship size and socioeconomic status. We empirically calibrate the social contexts for children to come into contact with each other using actual locational data (i.e., home, schools and public space, e.g., shopping centers). The model is then used to examine the effects of NME prevalence and contact under different social contexts on disease outbreak potential. Infection parameters are chosen to mimic that of measles. Actual prevalence data of NMEs in 1992 and 2013 are used to represent different NME regimes. **Results.** The higher prevalence of NMEs in 2013 compared to 1992 contributed to the disease outbreak potential. As expected, reducing contact at public places and at school lowers the average size of the outbreaks. However, contact at home has the greatest impact. It cannot be simply explained by the presumably high transmission probability of close contact at home. Rather, it is because the sibling links provide many local bridges spanning different schools (preschool and kindergarten) and grades, which make the whole network much more permeable for disease transmission. **Implications.** Whether NMEs should be permitted is heavily debated. U.S. Advocates of NMEs are attempting to repeal Bill 227, which will ban NMEs in California from 2016. Central to this debate is the public health consequences of NMEs. Vaccine preventable disease outbreaks are highly stochastic events and real-world experimentation is impossible/unethical. This study shows that large-scale, empirically calibrated simulation models can help identify conditions that would affect the probability of outbreaks and explore what-if scenarios, e.g., a drastically higher prevalence of NMEs, and evaluate potential intervention strategies.

Investigating organizational identities in multilevel networks with multiple membership, multiple classification models

Alessandro Lomi (University of Italian Switzerland), Francesca Pallotti (University of Greenwich), Mark Tranmer (University of Manchester), Anna Piazza (University of Greenwich)

A major line of contemporary organizational research links organizational identity to membership in multiple institutionalized categories. One consistent result delivered by empirical research inspired by these theoretical developments is that audiences tend to evaluate more positively organizations with more focused identities, and to discount organizations trying to broaden their appeal by spanning multiple categories. A related result is that the negative effect of category spanning on audience evaluation is stronger when the categories involved are more distant. One working assumption underlying these results is the absence of meaningful network dependencies that may cross cut the boundaries of categorical identities and confound their effect on audience evaluation.

In this paper, we examine possible consequences of the violation of this assumption. We reframe organizational identities as a two-mode network that affiliates organizations to institutionalized categories. We consider individual organizations as explicitly embedded in networks of dependence relations that they actively establish with other organizations.

We search for evidence of interaction between categorical and relational identities in data we have collected on a community of hospital organizations. Detailed information on internal portfolios of activities held by individual hospitals allows us to reconstruct with accuracy organizational identities based on patterns of affiliation to institutionalized clinical categories. We use collaborative interorganizational relations of patient transfer to reconstruct network structures in which hospitals are embedded.

We are interested in studying how audience evaluation varies as a function of: (i) Organizational characteristics of the hospitals; (ii) Structural characteristics of the clinical categories; (iii) Categorical identities of the hospitals, and (vi) Positions that hospitals occupy in the network of collaborative patient transfer relations. Our analysis focuses on the stability of these various effects through time.

We reconstruct audience evaluation in terms of patients' decision to leave the hospital against the advice of the doctors in charge of providing care. We adopt recently derived multilevel network models for multiple membership and multiple classification to examine cross-sectional and temporal variation in audience evaluation. In our specific empirical case, the clinical categories to which hospitals are affiliated represent the higher level in a multilevel system that has interacting hospitals at the lower level. The analytical objective of the model is to apportion the variance in audience evaluation across the different components of the multilevel system.

Authenticity and the effects of relational and categorical identities on restaurants reviews

Alessandro Lomi (University of Italian Switzerland, Lugano), Anastasia Giachanou (University of Italian Switzerland, Lugano), Fabio Crestani (University of Italian Switzerland, Lugano), Spyros Angelopoulos (University of Italian Switzerland, Lugano)

Recent research on restaurant organizations has found that specialist identities are systematically associated with positive perceptions of authenticity - a consistent relation between an organization's offerings and its underlying identity claims.

In this paper, we probe this relation further by studying restaurant evaluations expressed by professional food critics. We focus on food critics, rather than consumers, because markets for cultural products are typically mediated markets where intermediaries construct linguistic interfaces to facilitate communication and exchange between producers and audience sides of the market. We examine the corpus of restaurants reviews published in *The New Yorker* magazine between 2001 and 2013 as featured in the weekly column *Tables for two*. We present preliminary results of a data driven exploration of the bipartite network linking ingredients and national cuisines through restaurants. The 547 restaurants reviewed by food critics during the period of observation represent 42 distinct national cuisines (from American to Vietnamese). Our analysis of the aggregate corpus of text identified 512 distinct ingredients (from abalone to zucchini) that food critics associated with the various restaurants in their reviews.

Unlike social evaluations typically summarized by ratings expressed on fixed scales, opinions expressed by food critics in their reviews maintain all the ambiguity inherent in natural language. We use proximity-based techniques of opinion retrieval to estimate the sentiment associated with each ingredient (or food item) mentioned in the reviews. We are interested in understanding how the critics' opinion on (or "sentiment" about) individual ingredients changes across national cuisines and across restaurants. We explore the conjecture that such variation is related to judgments of authenticity - which we measure in terms of (i) affiliation of the restaurants to multiple national cuisines; (ii) relative prevalence of ingredients in each cuisine, and (iii) combination of ingredients associated to national cuisines. The results of the study contribute to current research on authenticity by showing how relational and categorical organizational identities of restaurants jointly shape the evaluation of food critics.

Friendship Networks and Adolescent Health-Risk and Health-Protective Behavior

Emily Long (Utah State University), Ginger Lockhart (Utah State University)

Background: Alcohol use and physical activity display opposite trajectories during adolescence, with notable increases in alcohol use and decreases in physical activity. Previous research indicates that peer group behavior in terms of alcohol use and physical activity is consistently correlated with individual levels of these behaviors, demonstrating the importance of understanding the social context surrounding these behaviors. To date, research on adolescent social networks and alcohol use and physical activity has neglected the simultaneous study of these behaviors, overlooking the potential power of examining their development within a shared social context.

The current study fills this important void by using recent advances in stochastic actor-based models to investigate the coevolution of adolescent friendship networks, alcohol use, and physical activity. The study nests alcohol use and physical activity within the shared social environment of an adolescent school network in order to model the processes through which friendships and both behaviors develop over time. Special interest is given to the contributions of selection and assimilation to friendship and behavior development to explore the possibility that these processes operate differently for alcohol use and physical activity. By extending the use of stochastic actor-based models to the coevolution of adolescent friendship networks and two different types of health behaviors within a social network, potential differences in the mechanisms of peer dynamics can be examined. In order to leverage the importance of peer relations during adolescence in efforts to prevent, alter, or promote critical health behaviors, such as alcohol use

and physical activity, a more clear representation of the interdependencies between adolescent social networks and varying health behavior is needed.

The study addresses the following research questions:

1. Do adolescents select friends based on similar alcohol use behavior?
2. Do adolescents select friends based on similar physical activity behavior?
3. Are adolescents influenced by friends to adjust their alcohol use behavior?
4. Are adolescents influenced by friends to adjust their physical activity behavior?
5. Does the relative strength of these processes differ across these behaviors?
6. What is the interactive nature of alcohol use and physical activity? (e.g., does increased alcohol use predict decreased physical activity or vice versa?)

Data: The National Longitudinal Study of Adolescent to Adult Health (ADD Health), Wave I and Wave II in-home surveys, are used. The network consists of one of the largest schools within the saturated sample of ADD Health (N = 640).

Analysis: The current study investigates the coevolution of adolescent friendships, alcohol use, and physical activity using stochastic actor-based models for network-behavior dynamics. The relative contributions of selection and assimilation are assessed for both alcohol use and physical activity. A forward model selection procedure using Neyman-Rao score tests is used. In order to provide a quantitative measure of the amount of network autocorrelation allocated by a fitted model to the processes of selection and assimilation across both behaviors, the current study uses a simulation approach described in Steglich, Snijders, and Pearson (2010).

Sources and changes in social support as athletes recover from serious sports injuries: Retrospective study

Ruth Lowry (University of Chichester), Carl Bescoby (University of Chichester), Melissa Day (University of Chichester)

When an athlete suffers an injury the event can threaten their future success, longevity of career and psychological wellbeing (O'Connor et al., 2005). Sport injuries encompass a wide range of injuries, including: concussion, ligament sprains and strains, and central nervous system damage and can occur in all sports and at all levels of competition. Sport injury may cause severe mood disturbances such as anger, depression, frustration, fear and confusion due to the functional loss of participation and can have implications for rehabilitation and recovery outcomes. Social support is an important factor in facilitating recovery from injury (Bianco, 2001) with positive social support identified as reducing the distress caused by injury (Wrisberg & Fisher, 2005). Using a retrospective, mixed method design, perceived social support received by individuals was examined. Analysis was undertaken using personal social network analysis tools and semi-structured interviews. Participants were 10 current athletes (6 males, 4 females) with an age range of 18-27 years, involved in various sports at club, county and regional level. Participants had self-identified a serious injury during their sporting career sustained within the last 3 years. Athletes completed two sociograms one to reflect their current personal network and the second their network at the time of the injury. This was followed by a 30 minute interview to explore the perceived significance of these relationships and changes that occurred as a result of the injury. A thematic analysis was used to explore the emergent themes from the transcripts. Results revealed positive and negative experiences of injury recovery with varied perceptions and structures of social support across groups. Six of the 10 participants reported a positive injury recovery, 4 found their personal network increased as a result of the injury whereas 2 found it decreased. Of the four participants who reported a negative injury recovery, with the exception of one, reported increases in their network size. Thematic analysis revealed 3 sources of support from existing connections in sport (coach, team captain) and personal worlds (friends, family) but also from previously unknown or distant connections with medical professionals (doctor, physiotherapist). Pre-existing (personal and sport) and emerging (medical) relationships were reported as both supportive and non-supportive. Across the two time points, relationships with family remained constant whereas many reported changes in the dynamics with their sport related contacts. Family were perceived as the most supportive and valued support providers, emotional support was most cited. Trust was repeatedly highlighted as an important quality in the relationship with medical practitioners and attributed as important in the success of recovery from injury. All participants viewed coach support

as more important than that offered by the team captain. Participants that experienced a positive injury recovery appraised their coaches as understanding, offering good advice and encouragement. In contrast those who negatively experienced injury recovery reported an absence of support from the coach, leaving them feeling forgotten. The study highlights the importance of exploring the multi-faceted influence of social support perceptions on the experiences and expectations of the individual's recovery from severe injury.

Online Dating Preferences: Two-Mode versus One-Mode ERGM Network Analysis

Alina Lungeanu (Pennsylvania State University), Diane Felmlee (Pennsylvania State University), Derek Kreager (Pennsylvania State University)

Social network scientists have begun to examine patterns of partner choices in online dating. Most research provides strong evidence of homophily, in which participants seek out partners who resemble themselves on the basis of several sociodemographic characteristics, such as race, physical attractiveness, educational status, and age. Some studies, however, find that daters' choices of potential partners display patterns of "vertical," or "hierarchical" sorting, rather than "horizontal" matching, on the basis of certain qualities, such as attractiveness. The results regarding hierarchical sorting suggest that website participants target more attractive individuals, rather than those who are similar to them in level of attractiveness. The purpose of this study is to further investigate these types of internet dating preference patterns, employing two-mode, rather than one-mode, network analysis.

To date, social network research on this topic often treats online dating exchanges among a sample of heterosexuals as a one-mode network, meaning that a tie between any two actors is possible even though within-gender ties are not observed. However, if truly heterosexual, online dating networks are technically two-mode, unidirectional networks, in which actors can be partitioned into two groups (e.g., males and females) such that all links are between-group links and no within-group links exist. Here we argue that men and women may differ in their patterns of partner preferences, and that these differences only can be disentangled by applying a two-mode network analysis approach. We apply this approach to an analysis of dating website data.

The data set includes 3,964 active, single, heterosexual users from one mid-sized southwestern city, and consists of 13,534 messages exchanged during one month. We constructed three networks: (1) a one-mode directed network that included all users and their messages, (2) a two-mode network that included messages initiated by men only ("men-to-women"), and (3) a two-mode network that included messages initiated by women only ("women-to-men"). We then used one-mode and two-mode Exponential Random Graph Models (ERGM/p*) to test users' matching patterns on race, education, age, and attractiveness.

Findings demonstrate that men and women's partner preferences do diverge with respect to certain characteristics when we employ a two-mode, bipartite, ERGM analysis. In particular, differences emerged with respect to particular categories of race, education, and attractiveness. In addition, findings for attractiveness depended on whether the variable is standardized or not, or treated as categorical. In a categorical analysis, for example, females of moderate attractiveness failed to exhibit significant levels of homophilous partner preferences, whereas males of moderate attractiveness did display significant matching on attractiveness. These findings contrast with those of the one-mode network analysis, which reveal significant attractiveness homophily for all users, presumably because messages initiated by males far outnumber those sent by females. The analyses demonstrate the advantages of treating heterosexual, online dating networks as two-mode, rather than one-mode.

Agent-based GeoSocial Visual Analytics for Epidemic Control

Wei Luo (University of California, Santa Barbara)

Airborne diseases spread via the network of physical contacts among individuals through a population over space and time. Researchers use agent-based epidemic models to simulate disease transmission and assess control scenarios over the human contact network, but little work has been done to effectively analyze network structure before the control scenario design. This study argues that the insight gained through an effective network structure analysis allows the development of advanced control scenarios. Hence, this research proposes a new concept in terms of effective disease control that should start from the understanding of social network structure over space and time, designing effective control measures accordingly, and evaluating the efficacy of different control measures. This concept is used to frame design of a new visual analytic tool that consists of three components: geo-social network data mining,

agent-based epidemic models, and combined visualization methods. The goal of this research is to develop geo-social visual analytic methods and tools that can assist researchers in developing and using agent-based epidemic models to gain insight on disease spread and epidemic control. Aiming towards the goal, there are two linked research objectives: (1) developing visual analytics methods and tools to represent complex network data as geo-social forms that can facilitate the discovery of useful patterns in terms of disease spread and transmission control; (2) developing methods to transform the useful patterns identified through this tool into reliable knowledge to support the decision-making process in epidemic control.

The Measurement of Guanxi Circles—Using Qualitative Study to Modify Quantitative Measurement

Jar-Der Luo (Tsinghua U.), Han Xiao (Shanghai Finance and Economics University)

This article demonstrates how to integrate qualitative and quantitative studies together in network analysis, and uses measuring guanxi circles in an organization as an example. We first conducted various qualitative studies: collecting second-hand data, noted field observations, in-depth interviews, and informal surveying of all workers with open questions, to classify all actors by roles in guanxi circles that were centered on the organization's supervisor. This is the "ground truth" used for testing the accuracy rate of our various methods of quantitative measurement. We then computed guanxi circle effect, denoted as G_{ji} , by which we further classified all actors into guanxi circle roles using quantitative methods. By comparing the results with the "ground truth", we found the five best questions in our survey and the best computation method so as to form a quantitative measurement with the highest accuracy rate.

Innovation networks: Structural differences between data collected from primary and secondary sources

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Network approaches to the study of innovation often use secondary data, either in the form of patents or publications in order to examine co-inventorship and co-authorship. Less frequently, network approaches involve the collection of primary data. Rarely if ever do studies of innovation combine the two. Intuitively we would expect differences between primary and secondary data. Both approaches have been criticised, either as lacking objectivity in the case of primary data, or nuance and detail as in the case of secondary data. Further, both approaches allow different insights into innovation as they necessarily utilise quite different types of network ties. However, are there some types of primary data network ties that are more similar to secondary data networks? And where there are differences, do these differences demonstrate some form of regularity? In this presentation we conduct a social network analysis of scientific innovation networks in the field of polymer science - more particularly, in the area of controlled radical polymerisation (CRP). Using exponential random graph models (ERGMs), we show the structural differences between the secondary data networks of co-inventorship and co-authorship of polymer chemists with primary data networks such as trust, advice and collaboration. The results show us that we may overestimate the amount of collaboration when using secondary data, and that the asymmetric nature of advice-seeking and knowledge flows are unable to be adequately captured from secondary data. The systematic ways in which these networks differ are discussed, concluding with the implications for studies of innovation networks and the limits of the differing data sources.

Network structure and team performance: study of Slovene and Finish organizations

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Leaders of teams play an important role in organisations since they link team members together and represent their teams elsewhere in the organisation. Ties that constitute personal networks of team leaders can facilitate team and firm performance, since they provide access to and control over internal and external resources and knowledge.

Previous research on group leaders mainly focused on different leadership styles and personal attributes of leaders, and their influence on group performance, while less attention has been devoted to social relationships in which leaders are embedded (Mehra et al. 2006). Recently, under the social network analysis approach, the theory on leadership changed its focus from being centred on leaders' characteristics to leaders' networks that include individuals inside and outside of their organisations. However, as noticed by Mehra et al. (2006), research on leaders' social networks only rarely examines the role of both internal and external social ties in understanding team performance. Previous research has either focused on external network ties that connect teams with one another (Hansen 1999), or on the internal network structure and ties within groups (Sparrowe et al. 2001). In our study of Slovene and Finish organizations, conducted between 2009 and 2012, we aim, first, to contribute to the knowledge of how leaders internal and external ties combine into leadership networks that lead to high team performance, and second, to examine whether the effect of network structure on team performance varies in dependence of the national context and organisational culture.

The Silicon Valley wage cartel: How cartel membership spreads and its impact on management job transitions

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In 2013, Google, Apple, Adobe, Intel settled a class action lawsuit for \$435 million. The suit alleged that these companies acted to suppress employee wages throughout Silicon Valley by colluding with other tech companies. Despite the enormity of this settlement and the implications for worker rights, few academics have yet examined the cartel in detail. In this research we ask two related questions: (i) how did cartel membership spread between tech companies in Silicon Valley, and (ii) how did cartel members differ from non-cartel members in the hiring of managerial talent? To answer these questions, we utilize a unique database of corporate director interlocks and managerial employee job changes between Silicon Valley firms between 2005 and 2014. Our analysis examines both the structure of the corporate interlock network as well as the network that results from managers changing jobs to work at different companies.

To isolate the population of public firms for analysis we used the Silicon Valley 150 list to find the largest technology firms based on revenue that operate in Santa Clara, Santa Cruz, southern San Mateo and southern Alameda counties. We matched these firms to Compustat for firm-level data and used BoardEx - a human resources database of managers and directors - for information about job transitions of managers. Using this information we compiled a database of all managers that currently or historically worked at one of the companies in our analysis. We then created networks of job transitions between firms aggregated over the periods of 2005-2009 and 2010-2014.

Our preliminary analysis indicates that firms that maintained corporate interlocks with other firms that were cartel members were also more likely to join the cartel. In terms of the job transitions of managers, we find that firms that were cartel members tended to have more job movements (hiring new workers and leaving workers combined) compared to non-cartel firms. In the period after the cartel was discovered and broken up the overall labor flows experienced by these companies decreased significantly. Future work will examine these labor flow networks using a generalized exponential random graph model (GERGM).

Taken together, these results indicate that the period in which the cartel was operating resulted in greater labor flows in and out of cartel member firms. Indeed, cartel member firms have significantly higher betweenness centrality scores in the labor flow network compared to non-cartel members. These early results suggest that an analysis of labor flows could result in a useful screening tool for policy makers concerned with finding potential cases of collusion between corporations that attempt to affect the labor market.

Platform Effects in Social Media Networks

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Even if external researchers have access to social media network data, without being privy to decisions that went into platform design—including the measurement and testing that goes into deploying new platform features seeking to shape user behavior towards desirable ends—it is difficult to know whether observed behavior generalizes to social networking in general or if is the result of successful platform engineering. One opportunity to study the effects of such platform engineering comes when collected data includes the introduction of a new feature. We consider

a data set from Facebook New Orleans, crawled in 2009, in which researchers have noticed a large increase in the number of edges and triangles coinciding with the introduction of the triadic closure-based “People You May Know” recommendation feature. Applying the observational inference technique of regression discontinuity design, we quantify the effect that making social media users aware of opportunities for triadic closure has on actual triadic closure. Especially since such closure-based recommendation systems are widespread in social media platforms, this gives us an opportunity to theorize the nature of networks that exist on these privately-owned and deliberately engineered platforms, and helps build an understanding how we can properly relate these networks to other social networks.

Network studies in Russia: the structure of a scientific community

Daria Maltseva (National Research University Higher School of Economics - International laboratory for Applied Network Research)

While the social network analysis in Western sociology is recognized as a discipline from the 1970's and is characterized by the presence of its own professional community, journals, conferences, knowledge transfer centers and educational programs, in Russian science social network analysis is quite a new form of research methodology. Even though during last years there can be seen the appearance of a community of scientists called “network researchers” and development of institutionalized forms of their cooperation as research sections at universities and organizations, Russian network researchers community's structure and its inclusion into the international discourse on network studies is needed to be examined. The report presents the results of the study of a current state of development of network research in social sciences in Russia, which is based on the citation (references) analysis of the publications in Russian scientific journals (using the eLibrary data base). With the usage of SNA techniques networks of researchers involved into the network studies in Russia is constructed. The research hypothesizes that the given field is currently fragmental and each group of Russian scientists cite “their own” set of other authors, who are mainly foreign. It can be also expected that Russian-foreign networks of citations would be dense, with well-identified centers and clusters, while just Russian network would be thin and without clusters. According to the research data, the conclusions about the gap between scientific communities of network researchers can be made. There are several clusters in Russian SNA field which mostly don't correspond with each other. Overcoming this gap requires some efforts from both the scientific policy makers and scientists themselves.

WHO CONTROLS THE INDIAN ECONOMY: THE ROLE OF FAMILIES AND COMMUNITIES IN THE STRUCTURE AND EVOLUTION OF THE INDIAN INTERCORPORATE NETWORK 2001, 2005 and 2009

Dalhia Mani (HEC Paris), Rodolphe Durand (HEC Paris)

The elite control of economic activity is a matter of great public debate and concern, and research on emerging markets frequently notes the role of a few families and communities, which control the economy via chains of ownership ties. However, we know surprisingly little about the extent to which specific social groups actually control ownership networks and how their role changes over time in complex societies with multiple social groups based on language, religion and regional origin. In the Indian context, we find that the greater the number of community members on the firm's board, the more nested the firm is within increasingly cohesive substructures in the intercorporate network. In contrast, the more family presence on the board, the more likely that the firm is isolated or peripheral in the network. Over time, the intercorporate network in India becomes progressively less cohesive, but community-led firms continue to occupy the most nested positions within this network, while family-led firms become increasingly peripheral. We also find significant variation across different communities in the extent to which they influence firms' nestedness within cohesive substructures. We extend theory on the social control of organizations with a more complex and dynamic interpretation of the role of social groups in shaping corporate networks.

A Nationally Representative Sample of Ego-Centric Personal Cognitive Networks

Christopher Marcum (National Institutes of Health), Laura Koehly (National Institutes of Health)

One of the long standing challenges faced in social network science is balancing the trade-offs between different modes of network measurement and study design. At one end of the spectrum, completely ego-centric network designs facilitate access to a large, generalizable sample of the population but often lack details on the underlying

network structure that embed each respondent. At the other end, whole-network designs offer fine details about the network structure but are costly and suffer from generalizability limitations. In this paper, we propose a network sampling design that strikes a balance between these two cases by leveraging how individuals perceive their social worlds. We describe a large sample ($n=1506$) of ego-centric measured personal networks where respondents informed on their perceptions of the ties between the alters they enumerated on two close contact name generators. Average network size was consistent with past literature on free-design ego-centric instruments (McCarty et al. 1997) at 10.5 ($sd=6.28$) alters and average alter-alter density was, as expected for close contacts, high at just over 0.50 ($sd=0.30$). We discuss results as distributions of network statistics grouped by network size and characterize bivariate relationships between ego's characteristics and network structure. To our knowledge this is the first study to characterize the distribution of mental maps vis-a-vis perceived complete alter-alter relationships in a nationally representative sample of respondents.

Relationship Change in Social Networks: Analyzing Change in Support Provision within Network Ties and Implications for Single Name Generator Longitudinal Studies

Alexandra Marin (University of Toronto)

Studies of network change commonly examine turnover in networks (the entry and exit of ties) or changes in the properties of networks. However, network change includes not only change in the ties present within a network, but change in the properties of relationships represented by those ties. Using data from a longitudinal study of social support networks, this paper presents findings about change in the types of support provided by ties who remain in the network continuously. I show that a significant minority of alters who remain in the network at two points in time have changed the kinds of support they provide, either discontinuing a support previously provided or providing a new type of support. This does not appear to be an artifact of methodology or memory. Analyses show that changes in support provision could result in frequent mis-detection of network membership change in studies of support networks based on single name generators. The second portion of the paper examines in greater depth the implications of this change for longitudinal studies of support networks that rely on single name generators, where a change in support provision is indistinguishable from entry or exit of network ties. I compare measures of network changed based on each single name generator to those calculated from the network elicited by all six name generators.

Do You See What I See? Role of Homophily in Organizational Social Structure Perception

Joshua Marineau (North Dakota State University), Sukamarakurup Krishnakumar (North Dakota State University)

Previous studies on shared social network perceptions have found that structural antecedents, such as two people tied to each other or embedded within a common third party, can help explain why two individuals develop similar perceptions of the social network. However, scholars have not fully considered other critical factors which might contribute to shared perception. Specifically we examine the role of homophily to explain shared network perceptions of both positive and negative ties beyond previously tested structural factors. Drawing on theory from the managerial cognition and homophily traditions, we test the effect of same sex and same ethnicity homophily on shared meaning, conceptualized as the degree of similarity in interpersonal social relationships perceptions between individuals in the organization. To this end, we use both positive and negative tie cognitive social structure data collected from the technical call center of a US restaurant equipment manufacturing firm. Our results indicate that both sex and ethnic homophily influence shared perceptions of the organization controlling for structural antecedents. Additional analysis found that both majority and minority ethnic subgroups exhibited similarities of network perception, suggesting that homophily effects were not limited to the dominant ethnic group. Such effects were found across both positive and negative tie networks. Additionally, we detected systematic biases in third party individuals perceptions of positive and negative ties for homophilous dyads.

Predictive Health Analytics with Networks

Luke Matthews (RAND Corporation)

Distinguishing homophily from social influence is a longstanding focus of network science generally and a focus of network analyses of health conditions such as stress, obesity, and smoking. Applied uses of network analysis, however, often focus more on using networks for prediction and market segmentation than on causal inference. I used just

such an applied prediction approach to study how social networks could predict Body Mass Index (BMI) among employees of a medium-sized corporation. Results showed that proper filtering of email metadata outperformed a standard network survey in the task of predicting BMI of individuals based on the BMI of their network connections. At the level of connections among populations, networks are proving useful for the prediction of changes in public health behaviors and public health policies. Networks have significant potential for applied predictive models used in the public and private sectors even if causal inferences remain elusive.

Interpersonal network dynamics in an emerging crisis

Carolina Mattsson (Northeastern University), Drew Margolin (Cornell University), David Lazer (Northeastern University)

The Boston Marathon bombing is an excellent case study to develop our understanding of the civilian component of crisis response. Thousands experienced shock, fear and uncertainty to a degree rarely seen by civilians in stable democracies. Civilian self-coordination in the face of disaster is far from well understood, but is thought to be a crucial component of community resilience. How individual actions aggregate into a decentralized response on a community scale is a lingering question for researchers in emergency response and resilience. The authors used a smartphone app to collect detailed data on the mobile communication patterns of over 100 people affected by the bombing. By combining contact records from the day of the bombing with communication averages over the previous month and detailed survey questions about the relationships involved, the authors construct detailed ego-networks of the respondents. We find systematic patterns of mobile communication in the wake of the bombing, indicating consistencies in the use of social networks in times of crisis. Peers in the area and close family members are the most likely contacts in the immediate aftermath of the bombing, and early mobile contact is more likely for nearby respondents who were alone at the time. Calling patterns have a stronger response than texting for those affected. Furthermore, mobile communication changes character in the hours after the event, and shows indications of providing tangible practical and emotional support to people affected. After about an hour calls become much longer and often include emotional support. Extrapolated to a larger scale, the mechanisms described provide an explanation for how support of various forms emerged out of social networks and flowed to the population affected by the bombing in a decentralized manner.

Dental Problems among Mexican Immigrants to the American Midwest: An Examination of Oral Health Matters Network Characteristics

Gerardo Maupome (Indiana University Network Science Institute), Erin Pullen (Indiana University Network Science Institute), Brea Perry (Indiana University Network Science Institute), Eric Wright (Georgia State University)

Latinos/as make up ~16% of the USA population. People of Mexican origin (Mexican-Americans, MAs) constitute about two thirds of Latinos/as. They are often stricken by a lack of dental health care services and poor oral health, and represent one of the ethnic minorities with considerable oral health disparities (OHD). Interestingly, a few reports from long-standing MA communities have found they experience better overall oral health compared to other Latino immigrant groups. This represents an epidemiological paradox, given numerous barriers to accessing dental health care, low rates of utilization among this population, and predisposing sociodemographic characteristics, like poverty. Taking advantage of the unique networks of groups migrating to areas of rapid Latino growth in the Midwestern USA, we explore how network characteristics may significantly correspond to OHD. Using ego network analytic techniques and data from the TalaSurvey Study, we explore the relationship between ego network characteristics of 332 MAs and several measures of self-reported oral health status. After controlling for ego-level sociodemographic characteristics and oral health factors, we examine network characteristics - including network closeness, Oral Health Matters (OHM) network size, and the proportion of ties with dental problems (1,299 alters). Findings reveal that increases in OHM network size and frequency of discussion regarding acute dental problems correspond to greater odds of experiencing adverse oral health outcomes, including dental pain, sore or bleeding gums, and tooth loss. However, ego network closeness and perceived level of knowledge about dental issues among alters are associated with lower odds of experiencing negative oral health outcomes. Importantly, these network characteristics are significant above and beyond individual ego sociodemographic characteristics, including current need of dental treatment. Overall, results of this research reveal that while certain egocentric network characteristics correspond to greater odds of oral health problems, others correspond to lower odds of such problems, and may be protective against these outcomes.

Implications of these findings for interventions and future research are also discussed. NIH DE022096-01A1, IU CTSA UL1TR001108, RR025761.

Geography, Gendered Networks and Well-being: the Case of Forced Migrants in Georgia

Olga Mayorova (Higher School of Economics), Beth Mitchneck (University of Arizona)

Social network analysis is a powerful analytical tool to understand the structure of social interaction and its impact on daily life. It also is a lens into how people exercise agency to achieve their goals through the construction and use of personal networks. In what ways do individual senses of well-being shape the agency used by them to construct personal networks? In what ways are personal network properties and network spatial configurations indicative of individual agency? Do these relationships vary by gender? Using the case of internally displaced people (IDPs) in the Republic of Georgia, we analyze the ways in which the structures and functions of the personal network reflect the agency used by IDPs to shape well-being. Because IDPs engage in a process of reconstructing networks in displacement, as a group, they present an excellent case to analyze the reshaping of networks. Striving for well-being of the individual or family is a primary occupation of those living in displacement. We use Sen's capability approach to structure our understanding of well-being and frame the analysis around the use of agency to achieve well-being. In our framework, agency is exercised through the development and use of personal networks. We suggest that understandings of well-being and the agency to achieve it are gendered processes that may be identified through an analysis of properties of personal social networks. Our findings suggest that personal networks are at the same time products of gendered socio-cultural and socio-spatial practices and parts of gendered agency to achieve well-being. The agency to achieve well-being while living displacement may be a primary motivating factor for shaping, reshaping and replacing personal networks.

Network Approach for Managing Agile Organizations

Ian McCulloh (Johns Hopkins University)

Effective organizations operate on a spectrum ranging from efficiency to agility. While efficient organizations have been studied extensively, agile organizations may be better understood through the application of social network analysis. The challenge for managers is that organizations are not statically efficient or agile, but must be adeptly managed from efficient to agile depending upon organizational requirements that may vary over time.

Agility within two knowledge intensive organizations is compared. Social networks are constructed using email, project co-billing, spatial proximity, and self reported surveys. Networks are modeled using exponential random graph models (ergm) and actor-oriented models (Siena) to compare network collaboration over time and between organizations.

Email and project co-billing data provide suitable proxy data sets to measure collaboration that are more readily available, even though they do not precisely map to self-reported network data. Insights for managers to make organizations more efficient or more agile are provided.

Global Private Capital: A Network Perspective

William McCumber (Louisiana Tech University)

The global market of inter-banking syndicated loans is a vast network of obligations upon which lenders rely for longer-term financing, and, in turn, provide to the real economy to finance projects. This network is explicitly modeled from 1998 to 2013 such that firms are nodes and loan facilities are edges in network terminology. Various measures of network topology are calculated, inclusive of temporal firm centrality, network density, transitivity, modularity, and community structure. Like many complex real-life networks, the global inter-lender network displays small world properties that insulate the network from adverse shocks overall. However, specific firms are shown to be systemically important at varying times; the removal of a systemically important firm fractures the network into dissolute communities, potentially disrupting the flow of capital to the economy. Both borrower and lender network centrality affect contract terms; overall, centrality lowers the cost of capital. Global network properties are also shown to inform micro contract terms.

What is a Relationship? – Friendship as a Mutually Perceived and Enacted Type of Relational Story

Daniel McFarland (Stanford University), Jan Fuhse (Humboldt University)

Social network theory has long failed to deeply consider the nature of social relationships and how they are practiced in and given form through social interaction. For example, social network analysts still presume types of ties exist without carefully studying how they are distinguishable and what signals demarcate them. As a result, theories for tie formation concern setting characteristics (e.g., composition, size, opportunities), selection processes (e.g., homophily, personality), and formal properties of social influence (e.g., transitivity, closure). Factors such as appropriate signaling and social skill are remiss. In part, this is a function of available data. Actual observations of social interactions across multiple types of longitudinal relationships are hard to come by. Moreover, the multivocal nature of interaction makes it feasible that the same interactional move can be attributed to multiple types of relations and institutional frameworks (e.g., the act of agreeing can be a signal of friendship, romance, deference to a superior, or even the activity of deciding what to order for lunch).

This paper attempts to directly consider the nature of relationships and the role of interaction dynamics more deeply. To this end, relationships are reconceptualized as a story between persons that is perceived (labeled), agreed upon, and enacted in interaction. From this perspective, types of ties like friendship are relational frameworks that are mutually recognized and enacted via certain interactional footings. To identify the effect of interactional footings over and above previously identified network mechanisms, we rely on systematic social observations of hundreds of settings that extend across one hundred thousand turns of social interaction, as well as longitudinally collected sociometric surveys and institutional records. With these data, interactions are not only coded for a variety of qualities, but they are situated in various social contexts and institutional framing efforts. For example, a particular interactional event, like the act of agreement between *i* and *j* at time *t*, can be embedded in a particular setting, a task (or sequence), a role-relation, and a reported friendship relation. Since most interactions are guided by any one or more of these framing efforts machine learning is employed to identify the interactions associated with each one while taking into account their overlap. Ultimately, the goal is to identify the interactional signal of a perceived and agreed upon reports of friendship. In such a fashion, we identify the interactional footings or “friendship script” that actors employ to signal the relational frame of “friendship”. This signal - as a latent dimension - is then tested for its predictive capacity on friendship formation to ascertain if it has an effect over and above previously held mechanisms of tie formation.

Local action and the pre-relational state: Creating uncertainty and delay in relational decisions so as to get the upper hand

Daniel McFarland (Stanford University)

When strangers meet, they quickly form an opinion or attribute identities to one another that guide ensuing interactions and forge their relationship. However, for some persons and some encounters, a pre-relational state of uncertainty is sustained and relational decisions are delayed. In most instances, this delay even results in greater success at forming positive interpersonal relations between the individuals. Given this, how do persons generate and sustain interpersonal uncertainty? And how do they use it to garner control over the relationship formation process so as to better ensure a positive outcome?

This paper explores and answers these questions through the study of 1000 speed dating encounters between 110 strangers. Data are drawn from audio files, transcripts, and survey reports (before, during and after the dates). Participants report not only their willingness to date, but also the perceived timing at when this decision occurred in the encounter. Using this information, a proxy is had for the timing of relational decisions and their outcome, as well as measures characterizing the kinds of interpersonal moves persons employed to extend a pre-relational state. Analyses explore how pre-relational states are sustained by situational factors and interpersonal styles of interaction that generate confusion and un-anchor common interpersonal expectations. Analyses also explore the role decision-delay on the outcome of relational decisions.

A variety of implications follow from this research. It may point to the greater role of interaction in tie formation; means by which interpersonal skill can be accomplished; and how social situations can be staged to prevent knee jerk reactions and thin-slice decisions.

Modeling Preferential Recruitment for Respondent-Driven Sampling

Katherine McLaughlin (University of California, Los Angeles)

Respondent-driven sampling (RDS) is a network sampling methodology used worldwide to sample key populations at high risk for HIV/AIDS who often practice stigmatized/illegal behaviors and are not typically reachable by conventional sampling techniques. In RDS, study participants recruit members of their social network to enroll, resulting in a sampling mechanism that is unknown to researchers. Current estimators for RDS data require many assumptions about the sampling process, including that recruiters choose people from their network uniformly at random to participate in the study. However, this is likely not true in practice. We believe that people recruit based on observable covariates, such as age, race, education, or frequency of interaction.

To model preferential recruitment, I develop a sequential two-sided rational-choice framework. At each wave of recruitment, each recruiter has a utility for selecting each peer, and symmetrically each peer has a utility for being recruited by each recruiter. People in the network behave in a way that maximizes their utility given the constraints of the network and the restrictions on recruitment. Although a person's utility is not observed, it can be represented as a linear combination of observable nodal or dyadic covariates plus unobserved heterogeneities. This framework allows inferences to be made about the preference coefficients by maximizing the likelihood of the observed recruitment chain given the observed covariates. Direct computation of the likelihood is computationally intractable, so I develop a Bayesian framework where inference is made feasible by approximating the posterior distribution of the preference coefficients via samples from a Markov chain. Each update step samples new values of the preference coefficients and utilities via Metropolis-Hastings, subject to constraints. This framework allows generative network models to be created for the RDS recruitment procedure, allowing for more sophisticated analyses to be performed.

Consumer Credit and Household Banking Networks in Renaissance Florence

Paul McLean (Rutgers University)

The vital core of ongoing Renaissance Florentine economic life resided in extensive commercial credit networks among export-oriented firms (Padgett and McLean 2011). Banks financed Florentine wool and silk production, and they also provided the means for exporting finished goods. Banks had extensive credit relations amongst themselves, too, built on an intricate architecture of current accounts held with each other. In addition, the Florentine society and economy was formed out of, and supported by, variegated patterns of interpersonal lending (Gondal and McLean 2013a, 2013b, 2014)—both among members of the commercial and political elite, and between elites and members of subordinate classes.

At the interstices between one-mode networks of personal credit and company credit were different kinds of two-mode networks: investments by individuals in companies on the one hand (i.e., influxes of start-up capital from company partners and occasional large deposits from people other than company partners); and consumer credit and household banking services offered by those companies to members of Florentine households on the other. Vast quantities of cloth produced by Florentine textile merchants flowed into local households, while bank loans to these households were also commonplace.

This paper analyzes patterns of flow in these two-mode investment and consumer-credit networks using a data set of company-to-person ties. I show the particular ways in which consumer credit and household financial credit were embedded in other kinds of social relations, such as family and neighborhood, and I explore how patterns of consumer credit and household financial credit were interwoven into each other, potentially creating recurrent triads of credit. In so doing, I document the existence of multiple forms of household credit in a market long before the well-known explosive spread of consumer credit in the late nineteenth and early twentieth centuries. I also discuss some of the problems with teasing network information out of archival sources, and certain challenges in distinguishing some types of ties from others when documentary sources are not always transparently clear.

How Knowledge Travels: An Analysis of the Diffusion of Philosophy of Science Over 60 Years

John McLevey (University of Waterloo), Kathryn S Plaisance (University of Waterloo)

Proponents of increased interdisciplinarity often argue that disciplinary knowledge does not travel well beyond narrow specialist communities. This view has recently been challenged by quantitative and networks research, much of which shows that intellectual practices within disciplines are more dynamic and boundary-spanning than critics give them credit for. Both of these positions have a tendency to make overly general claims that downplay disciplinary differences

and variation in the exchange relationships that form between disciplines. This is partly due to an almost exclusive focus on cases where the boundaries between disciplines are porous, and where there are overlapping substantive interests and goals. We know much less about if and how knowledge travels between fields that are further apart. This paper uses network diffusion models to test hypotheses about the diffusion of philosophy of science into the sciences. We report findings from an analysis of (1) a new diffusion network dataset on hundreds of thousands of articles in philosophy of science and the sciences over 60 years, and (2) a social networks survey of contemporary philosophers of science.

Gender Differences in Friend Selection and Peer Influence: Applying a Dynamic Network Approach to Study Adolescent Delinquency, Drinking, and Smoking

Cassie McMillan (Pennsylvania State University)

Previous research has confirmed that friend selection and peer influence concurrently explain why adolescents tend to exhibit similar problem behaviors as their friends. However, substantially less work has considered whether gender moderates these relationships. In this study, I examine whether the selection and influence processes regarding three specific problem behaviors (delinquency, drinking alcohol, and smoking tobacco) operate differently for adolescent girls and boys. I consider whether girls or boys are more likely to select friends with similar problem behaviors as their own and whether one gender is more prone to be influenced by their friends' participation in such behaviors.

Using SIENA software, I construct dynamic stochastic actor-based (SAB) models that are ideal for disentangling whether friend behavior similarity is the result of selection or influence processes. I apply these models to five waves of respondent-nominated friendship data on students who participated in the PROSPER study, yielding a sample of over 13,000 adolescents who attended sixth through ninth grade in one of 26 U.S. school districts. The sample includes respondents from two consecutive grade cohorts, resulting in 51 complete friendship networks. To aggregate the SIENA findings from each individual network, I perform a three-level random effects meta-analysis using HLM software and create three sets of SAB models that respectively consider how selection and influence relate to individual participation in each problem behavior of interest. To test my research questions for each problem behavior, I also include SAB models that contain interaction parameters to measure whether selection and influence processes vary based on the respondent's gender.

Findings suggest that the problem behaviors of both girls and boys can be explained by friend selection and peer influence; however, for certain problem behaviors, girls' experiences are particularly shaped by these processes. Compared to boys, girls are more susceptible to be influenced by their friends' delinquency. Results from the drinking and smoking models reveal similar patterns; however, these gender differences in influence are not statistically significant. With regards to friend selection, girls are more likely to prefer friends who have similar smoking behaviors as their own. Gender differences in selection are not significant for the other problem behaviors, suggesting that girls and boys both tend to select friends with whom they share similar participation in delinquency and drinking. The findings of my study have the potential to better inform prevention and intervention campaigns on how to effectively target a diverse population of adolescents. By further considering why gender variations in friend selection and peer influence are not consistent across all problem behaviors, professionals can better meet the needs of at-risk youth on a variety of different anti-social and risky behaviors.

Indirect and Generalized Reciprocity Predict Networks of International Aid

David Melamed (The Ohio State University), Brent Simpson (University of South Carolina)

Most analyses of international aid focus on the attributes of recipient countries, such as their effectiveness at disseminating aid, their democratization, and their need. We consider flows of aid to represent directed networks between countries. As such, each instance of aid is embedded in a broader structural context. In particular, we argue that generalized and indirect reciprocity shape patterns of international aid. Specifically, we predict that those countries that receive aid will be more likely to give it (pay it forward), and those that give it will be more likely to receive it from third parties (indirect reciprocity). While the literature on prosocial behavior treats each of these mechanisms independently, we seek to test them simultaneously to discover their relative strengths. To test this argument, we converted over 100,000 instances of international aid into networks. The results are country-to-country networks of aid from 1983 to 2008. We fit exponential random graph models to these networks and the results reveal that generalized and indirect reciprocity have strong and consistent effects on the networks of aid, net of the attributes

that are typically thought to predict aid. In fact, our results show that the structural variables have substantially larger effects than standard predictors. We conclude with implications for the international aid literature and theoretical implications for the prosocial behavior literature.

Effectiveness of policies for innovation on a local level: a comparative study of social networks

Paola Menapace (University of Bielefeld, Bielefeld Graduate School in History and Sociology, (DE))

Innovation projects are characterized by cooperation between partners from different types of organizations. A specific challenge for innovation projects is how these partners develop a network that enables a functioning communication to increase the project's performance. The present study aims to investigate the effect of Donati's social reflexivity on team performance in the context of four innovation projects in which different public-private stakeholders entered a network to together develop a new product or a new technology. Previous studies used the concept of "team reflexivity", which is characterized by certain actions like planning, questioning, reviewing past events with self-awareness, learning at a meta level, etc. In my study I aimed at the concept of "social reflexivity", which considers an innovation team's capacity of being reflexive about the relationships within the team and of using this reflexivity to perform better. Two main hypotheses are considered: (1) The higher the degree of social reflexivity within the team the better the performance of the team at the end of the project. (2) Different innovation policy systems will result in different degrees of social reflexivity and thus, in turn, in different performances. The project involved data collection from two projects in the Eastern Netherlands and two projects in the region of North Rhine Westphalia, Germany. All projects were financed by the European Regional Development Fund (ERDF) in the past programming period 2007-2013 and are currently in their final stage. They are all in the field of biotechnology/bio-medicine. The 22 Partners who participated in the interview were asked to draw their own network map and to explain the perceptions about their own network referring to the last six months of the project. Then, during the interview, I used a second methodology in which I showed the respondents some images of networks that helped them to reconstruct changes in the structure of their own network map. For the analysis of the network data the Krackhardt methodology of the cognitive social structures is used to measure how similar each individual perceived network is to the general perceived network of the group. Of special interest are the positions of some relevant actors in the network and the perceived changes during the development of the network's structure. The analysis of the network maps is integrated using a content analysis of the interviews in which the partners explained their individual perceptions on the networks and their considerations about the final results of the project. The resulting perceived network distances served as an indicator of how much the social reflexivity is developed in the four innovation projects. It is discussed how the data can be explained and interpreted within the framework of Donati's Theory of the Relational Society. The results should reveal whether the relational steering is the dominant coordination mechanism that assures the most performative project or whether it is rather perceived as a barrier to innovation.

Community Engagement Interventions and Local Networks to Improve Health Services: Network Effects of the Community Partners in Care (CPIC) Cluster-Randomized Study

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This analysis presents initial results of one of the first agency-randomized trials of community engagement strategies on local inter-organizational networks to improve depression care. The Community Partners in Care (CPIC) study compared an intensive community engagement and planning intervention (CEP) versus a more standard resources for services (RS) technical assistance program to improve depression care services among diverse agencies in two underserved communities in Los Angeles, USA (n=95 total programs, including mental health, primary care, substance abuse, social support, homelessness, and various community-trusted services such as schools, churches, and parks). This analysis examines changes in inter-agency network characteristics (density, centralization, and network position of different types of programs) between the two agency-randomized conditions (CEP vs RS) in both communities. These findings are put in context with other CPIC study results on community characteristics (such as local resources, service landscapes, and collaborative histories), changes in program capacities (such as types of depression services provided), and client outcomes (such as improvement in mental health quality of life and homelessness indicators). Implications of the findings and unique community engagement strategies of CPIC will be discussed for generalizability to other community-partnered and network oriented interventions.

Estimating Demand Variability due to Social Network Influence: Hidden Costs of a Connect World

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In this paper we model customer purchase decision in order to understand the impact of social influence on demand distribution. Widespread access to social networks has led to renewed interest on social network influence in competitive markets. Access to information enables customers to choose products based not only on intrinsic preference but also on inner-circle influence and market share data. These influences may significantly increase variability and complexity in demand forecasting. We propose an analytical model to estimate demand based on these three factors of choice. We focus on extreme values of parameters representing weights of each factor where the probability distribution is more easily described. Then we build solution paths as parameters depart from the extreme points. We show that beta-binomial distributions are appropriate to represent demand distribution. To the best of our knowledge we propose the first model that considers those three different factors of choice in demand forecast. We also explore asymptotic cases where choice is mostly determined by intrinsic preference rather than social influence, or vice versa. We introduce small world networks to demand forecasting models and illustrate the impact of the increased variability using the newsvendor model framework. We use simulation in a case of a very large network to compare the results obtained to those by the approximation in order to test the accuracy of the forecast.

The ‘Strength’ of ties?: investigating teacher burnout from a social-structural perspective.

Chloé Meredith (KU Leuven), Sarah Gielen (KU Leuven), Eva Kyndt (KU Leuven)

Recent decades, there has been a growing attention for the concept of burnout. Burnout has been defined as a syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment (Maslach & Jackson, 1981) and is commonly associated with professions characterized by a high rate of close relationships with other individuals or groups (Vandenberghe & Huberman, 1999). The teaching profession is one of those professions as the school environment is filled with close relationships with students, parents, and colleagues (Skaalvik & Skaalvik, 2009). Specified for teachers, emotional exhaustion indicates a feeling of tiredness and being emotionally overextended by one's work, depersonalization includes the unfeeling and impersonal response toward students, parents and the workplace and reduced feelings of personal accomplishment are observed when the feeling of competence diminishes and they no longer feel as they are contributing to the development of the students (Maslach, Jackson, & Leiter, 1986). A wide array of research already investigated teacher burnout and the factors explaining the occurrence of this syndrome. Several of these studies concluded that social relationships with colleagues play a crucial role as they can both reduce or contribute to the symptoms of burnout (e.g., Abel & Sewell, 1999; Schlichte, Yssel, & Merbler, 2005). However, despite the conclusion that collegial relations might be an important aspect for understanding both the occurrence and prevention of burnout of teachers, only few researchers adopted a social network approach to investigate this syndrome from a social-structural perspective. As a result, it is, up to now, unclear how the actual social structure of the school team is related to teachers' feelings of emotional exhaustion, depersonalization and diminished personal accomplishment. In this study, the aim is therefore to understand if and to what extent the social structure of the school team can make a difference for teachers' feelings of burnout. More specifically, we investigate if the probability of experiencing feelings of burnout is related to structure of the (close) neighborhood of the teacher and the presence of burnout in this neighborhood. We use cross-sectional data of 626 teachers in 13 Flemish secondary schools (response rate >75%), gathered through an online survey. Autologistic Actor Attribute Models (Daraganova & Robins, 2013) are applied to analyze the relationship between the three dimensions of burnout and the structure of the social network of the school team. For these analyses, we use IPNet, an extension for social influence models of the PNet-family software.

Pathways to health and wellbeing - the social networks of orphaned and abandoned children (OAC)

Lynne Messer (Portland State University), Kathryn Whetten (Duke University), Anna Koons (Duke University), Christine Gray (University of North Carolina)

Background. More than 143 million children (ages 0-17) have been orphaned by the death of one or both parents. These orphans, in addition to the millions abandoned by their parents, are at profound disadvantage in terms of their educational attainment, employment opportunities and sexual risk. While well-understood that social networks are important during adolescence and early adulthood, how the social networks of OAC contribute to health and HIV-risk trajectories remains unknown. Further, how network attributes contribute to both current (time 1) and future (time 2) risk for adverse outcomes (low educational attainment, lower or more dangerous employment opportunities, higher rates of sexual risk behaviors) is not known. **Methods.** Longitudinal social and sexual network data have been collected from a community-representative sample of approximately 2000 OAC from four countries (Cambodia, Ethiopia, Kenya, Tanzania). Roughly equal proportions of the sample live in family- and institution-based settings. Network data collection occurred approximately 18 months apart as many OAC were transitioning from adolescence to adulthood. In multilevel linear or logistic fixed slope random intercept models, health and wellbeing outcomes (education participation, employment obtainment and sexual risk-taking) are predicted as a function of social network characteristics. Beta coefficients, odds ratios and 95% confidence intervals are reported. **Results.** Mean age at baseline was 14.1 with approximately 57% of respondents being female. A larger proportion of respondents named multiple alters providing educational support (90%) compared with alters providing employment support (9%). Females reported higher HIV risk behaviors than males at baseline. Network size, strength, type of support provided and alter characteristics varied by residential status (family- versus institution-based). Time 2 network data are still being entered and not available for inclusion in this abstract but will be presented for the meeting. **Discussion.** The long-term goal of this research is to identify key intervenable factors that contribute to OAC disadvantage or resilience over the lifecourse, in order to construct viable interventions for promoting OAC health and well-being. The social networks of OAC are a promising intervention-point for remediating the early-life disadvantages experienced by these youth.

International Trade of GMO Related Agricultural Products

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o **Purpose:** This study was conducted to analyze trade data describing key commodities (grains and other GMO related products) over a period of 27 years. o **Methodology:** Network centralities known as betweenness, closeness, degree and eigenvector were calculated to identify the role of trade patterns and country hubs over time. o **Results:** A growing geographical decentralization of actors at the global level has occurred, particularly since the 2000s, with developing countries becoming more prominent in bridging roles. Nevertheless, a few countries (China, Germany and the United States) showed consistently top levels of the centrality metrics. Trade flows have slowed down, in part due to the underdevelopment of transportation routes and lack of consistent trade agreements between countries. o **Limitations:** This study covered data until the year 2011; therefore, the more recent effects of negotiations and regulations on GM products and Climate Change were not included. o **Original value:** Despite agricultural products being a basic commodity, there is considerable variance in their availability world-wide, which embodies a significant issue of public health. In an increasingly interdependent world, fair political and economic agreements should be a priority in government agendas. Moreover, citizen's resistance towards GMOs indicate a lack of effective science communication from stakeholders involved in the research, production and diffusion of such products.

Almost random connections? Proto-networks among audiences and firms during new industry emergence

Stephen J. Mezas (INSEAD), Florian Schloderer (INSEAD)

Entrepreneurship researchers now look beyond individual founders and firms to model the processes and mechanisms by which information about new social forms diffuses to broader audiences. During industry emergence, the lack of agreement about legitimate organizational forms between audiences and firms may be a key problem. To explore whether network ties might fill this void, we develop an ecological model of emerging networks among audiences, and firms during the emergence of new industries. This model of emerging networks, which we call proto-networks, focuses on the properties of networks with a very small numbers of actors, far smaller than those described in the existing literature. We develop a theoretical framework that includes two kinds of proto-network ties, within-group, e.g., among audience members or among firms, and bridging, e.g., between audience members and firms. Based on this model, we suggest propositions about how these ties will affect two outcomes that are essential to the emergence

of new industry, the survival of firms and the growth of total industry resources. We use simulation methodology to test these propositions, finding strong support for the predictions of a proto-network model of industry emergence. We close by exploring some conclusions and implications of our model for both theory and practice.

Social network analysis approach to team sports: centrality tendencies of best teams based on player selection.

Antonina Milekhina (International Laboratory for Applied Social Network Analysis, NRU-HSE, Moscow)

Using social network analysis for team sports seems to be natural due to the character of interactions in team sports. As mentioned by Lusher, Robins and Kremer (2010) "SNA offers a range of tools that can augment and extend existing instruments and methods for the analysis of a number of the complex processes that operate within sporting teams". Social network analysis was? indeed applied to team sports but mostly from individual interaction during the game point of view (e.g. Mukherjee, 2013; Passos, 2011; Grund 2012; Bourbousson, Seve, McGarry, 2010 etc.). Effects of relationship among individuals within the team on team performance also were studied intensively (Fuster-Parra et al., 2015; Myers et al., 2004; Carron, 198 etc.). It was also stressed in multiple research that the notion of group cohesion is extremely important for team sports (Spink et al., 2005; Spink, Wilson, Odnokon, 2010; Carron, Bray&Eys, 2010 etc.). The greater group cohesion suggests the stronger ties within the group, though the research on higher performance of such groups is controversial (Rovio, 2009). However, for greater group cohesion of newly build teams the notion of familiarity is crucial (Dong, Prescod & Shah, 2014). In this research we measure the group cohesion of Ice Hockey World Championship national teams. National teams are called only to play during the World Championship which means that the previous familiarity of players may impact the group cohesion and their performance during the Championship. We suggest that players are familiar to each other if they play together in the club in a national league. In our research we study the impact of familiarity both within the team and towards other teams. The purpose of this research is to identify if any central tendency of the team in terms of player selection for a national team for World Championships out of club players and the familiarity of players with other players within the team and outside the team plays a significant role. The more generalized question is whether the team built of individuals from various different teams performs better than the team with less background variety among individuals.

Networks of Meaning or Meaning-making in Networks? - A Study of Socio-Semantic Change among Young Scientists

Manjana Milkoreit (Arizona State University)

The study of socio-semantic networks offers exciting opportunities to explore processes of learning, knowledge dispersion, but also social and behavioral change in diverse social settings. One of the field's major methodological challenges consists of the identification and collection of high-quality data for both social and semantic networks to enable a statistically rigorous analysis of socio-semantic change over time. So far, social media data has offered the promising inroads to this problem thanks to its ubiquity and the frequency of documented communication on Twitter, Instagram or Facebook. In this paper, we outline a very different approach - the attempt to observe socio-semantic change in real-time with the use of survey and interview techniques. We focus on a bounded population of social network members - about 100 young scientists who participated in a nine-day event focused on new ways of knowledge production in and for the Anthropocene. The Anthropocene Campus consisted of a series of multidisciplinary seminars and cultural events, in which participants explored different meanings of and approaches to studying the Anthropocene. Most participants did not know each other before and formed new network ties during the event. Our study used the Campus as a cognitive intervention, analyzing how it affected both the social and semantic networks among its participants over a 12-month period. We apply cognitive theories to identify, display and analyze semantic information as networks of concepts that generate meaning based on rules of emotional coherence. We hypothesize that the process of network change and the process of semantic change around the concept of the Anthropocene during the Anthropocene Campus mutually affected each other. In this paper we outline our theoretical and methodological approach, research design, the nature of the data gathered and the analytic potential contained in this data set. We sketch the research questions and data-related challenges when seeking to identify two different kinds of change: (1) the effect of social network structures on semantic change among Campus participants and (2) the effect of semantic change on social network structures. Our study highlights the potential of socio-semantic network analysis to offer unique insights into processes of scientific knowledge production, the emergence of novel ideas and

the factors that facilitate or inhibit the spread of certain ideas and concepts. While these insights are significant for the social study of science, the approach could also be applied to other areas of significant scholarly interest, including processes of social and political change.

Using networks to facilitate the use of research evidence by public school administrators

Kristen Mills (Michigan State University), Zachary Neal (Michigan State University), Jennifer Neal (Michigan State University), Jennifer Lawlor (Michigan State University)

Public school administrators face mounting pressure to adopt evidence-based school programming. However, the use of evidence-based programs remains remarkably low and schools often use programming with questionable effectiveness. In order for school administrators to make informed decisions about which programs to adopt, they first must acquire relevant research evidence.

The Michigan School Program Information (MiSPI; www.msu.edu/~mispi) project is conducting a statewide replication of Milgram's Small World Experiment to understand the barriers and facilitators of research evidence acquisition. A random sample of 600 superintendents and principals (50% response rate) were asked to initiate an information-seeking chain: "If you were looking for information about school programs, who would you talk to first?" A subsample of administrators have also participated in in-depth interviews designed to understand the information search process in greater detail, including how administrators select sources of information and how they use and weigh information acquired from different sources. Subsequent survey waves have traced these chains, with the goal of identifying two key outcomes: (a) whether the chain reaches a school program researcher or other high-quality information source, (b) the length of such successful chains, and (c) the types of intermediaries that appear in these chains. In this presentation, we will present descriptive results about chain success and length, characterize the types of individuals responsible for transferring information to school administrators, and present preliminary inferential results about the role of administrator (e.g. level of education, length of time in job) and district (e.g. student performance, number of students) characteristics on these outcomes.

The long-term goals of this project are to identify administrator and district characteristics that are associated with the formation of information-seeking chains that allow administrators to acquire relevant research evidence, and to develop an intervention for administrators and districts to facilitate the formation of such useful chains.

Merging social networks - roles and characteristics of brokers in corporate acquisitions

Nicola Mirc (Toulouse School of Management - University Toulouse 1 Capitole), Philippe Very (EDHEC), Norbert Steigenberger (University of Cologne), Mark Ebers (University of Cologne)

We address the role of brokerage in the integration of mergers and acquisitions (M&A). Brokers, as individuals that connect different unrelated sub-groups of a network, can play essential roles in M&A integration since their positions at the intersection of both organizations provides them with particular opportunities to promote inter-organizational relations during the post-acquisition period. We investigate the properties and roles of such "acquisition brokers", i.e. actors who promote acquisition integration through the relationships they span across the boundaries of merging firms.

Building on a longitudinal case study of an acquisition in the consultancy sector, we identified acquisition brokers and their characteristics at successive points of time in order to understand how these evolve along the integration phase. We find that acquisition brokerage is most importantly supported by individuals occupying central positions in each focal firm (in terms collaborative practices and extraprofessional relations). For these already prestigious individuals, however, an activity as acquisition broker does not provide any benefits in terms of future enhanced collaboration opportunities, financial performance or career advancement. Inter-firm brokerage actually benefits only those who were not already well connected beforehand as it increases their social and business-related assets.

Committed activists and the reshaping of status-quo social consensus

Dina Mistry (Northeastern University), Qian Zhang (Northeastern University), Nicola Perra (Greenwich University), Andrea Baronchelli (City University)

The role of committed minorities in shaping public opinion has been recently addressed with the help of multi-agent models. However, previous studies focused on homogeneous populations where zealots stand out only for their

stubbornness. Here, we consider the more general case in which individuals are characterized by different propensities to communicate. In particular, we correlate commitment with a higher tendency to push an opinion, acknowledging the fact that individuals with unwavering dedication to a cause are also more active in their attempts to promote their message. By using the framework of activity-driven networks, we show that these activists are not only more efficient in spreading their message but that their efforts require an order of magnitude fewer individuals than a randomly selected committed minority to bring the population over to a new consensus. Finally, we address the role of communities, showing that partisan divisions in the society can make it harder for committed individuals to flip the status-quo social consensus.

MMMM: Using Multiple Membership Multilevel Models to Analyze Networked Organizations

Guang Ying Mo (University of Toronto), Barry Wellman (NetLab Network)

In networked organizations, workers are members of multiple groups rather than being members of one group that reports to a single supervisor. Thus, in networked organizations, workers have only partial commitments to any one group. We suggest that the definition of multilevel networks in networked organizations should include three fundamental components: (1) two sets of nodes composed of individuals and groups; (2) individuals' networks that can stretch across group boundaries; (3) each individual's membership in one or more groups that in turn form the affiliation or meso-level network. We stress that the meso-level network is more static when compared to the networks at the individual level as it is constrained by the groups' characteristics.

Having reviewed several quantitative approaches to multilevel modeling of organizations, such as Hierarchical Linear Models (HLMs) and Exponential Random Graph Models (ERGMs), we show how recently developed multiple membership multilevel models (MMMM) can analyze networks where people may be members of more than one group. In the original MMMM models, Hill and Goldstein (1998) assigned a proportional weight according to each individual's memberships within each unit, and within the group as a whole, summing to 1. In this study, we transform the strength of ties at the meso-level network into proportions so that the total of each node's strength of ties at the micro-level added up to 1. We use MMMM to analyze the case study of a Canadian research organization whose members participate in multiple projects and have complex networks within and between projects. Our MMMM analysis shows that project characteristics of project teams have a strong impact on individual relationships.

Fitting MMMM to multilevel multiple membership data achieves several goals. First, it enables us to elaborate how the characteristics of one or multiple group-level nodes jointly influence the individual-level network across groups through the meso-level network. Second, MMMM affords the examination of the relationships among individual-level variables with the nuances of the combined contexts of multiple groups. Third, MMMM can investigate multiplexity by comparing the impact of group characteristics on different types of ties at the individual level. Fourth, although we have used MMMM to analyze organizations, they are also applicable to multilevel network data from non-organizational settings because they do not require the existence of ties among group level nodes. Fifth, in addition to elaborating on the effects that multiple memberships have on individual-level networks MMMM provides insights into cross-level interactions within multilevel networked organizations. Sixth, our proposed models can be used to evaluate the effects of organizational design.

Of course, there are limitations in our model and our research. First, MMMM does not permit us to specify which particular groups are affecting individuals. Second, although we believe our approach can be generally useful, we note that a large research network is not a large formal organization or even a small one. We look forward to discovering how MMMM works within the context of more formal networked organizations.

An investigation of variation of evidence-based implantable cardioverter defibrillator treatment in the U.S. from a network science perspective

Erika Moen (The Dartmouth Institute for Health Policy and Clinical Practice), Andrea Austin (The Dartmouth Institute for Health Policy and Clinical Practice), Julie Bynum (The Dartmouth Institute for Health Policy and Clinical Practice), Jonathan Skinner (The Dartmouth Institute for Health Policy and Clinical Practice), A. James O'Malley (The Dartmouth Institute for Health Policy and Clinical Practice)

The application of social network methodology to the field of healthcare delivery is still in its infancy, yet its pursuit is motivated by recent evidence that professional relationships between physicians influence prescribing behavior,

technology diffusion, and quality and cost of care. An example of a prescribing behavior that has significant variation across the country is the use of implantable cardioverter defibrillators (ICDs) in patients with cardiovascular disease at risk of heart failure. This variation exists despite established guidelines for ICD use from the American College of Cardiology Foundation. In this work, we used information from the National Cardiovascular Data Registry to determine the number and rate of evidence-based ICD surgeries that occurred within each hospital and the broader hospital referral regions in the United States. We hypothesize that the structure of local organizational networks of physicians yield important predictors of physicians' adherence to clinical guidelines when selecting patients for ICD surgery. To test these hypotheses, we perform a nation-wide examination of the network metrics of hospitals, physicians, and ICD capable physicians, and how they relate to evidence-based patient selection for ICD surgery. This approach may suggest novel and more effective methods for improving evidence-based care through intervention on a professional physician network. We find that the eigenvector centrality of physicians who implant ICDs, referred to here as ICD capable physicians, is associated with evidence-based ICD practices. We also will discuss our identification of an association between guideline-supported care and patient sharing practices among ICD capable physicians.

Toward A Computational Hermeneutics for Social Network Analysis

John W. Mohr (University of California, Santa Barbara), Robin Wagner-Pacifici (The New School), Ronald L. Breiger (University of Arizona)

Network analysis has increasingly been applied to the study of texts, especially within the context of Big Data. This has resulted in a burgeoning field of innovative new work in theory, measurement, and substantive analysis by prominent network researchers including Kathleen Carley, Jana Diesner, and Peter Bearman, among others. We argue that this expansive research at the intersection of network analysis and text mining opens up the possibility of an additional new departure that deserves thoughtful consideration, a move that we, following the literary critic Kenneth Burke, identify as a shift from a semantic reading of textual data to a poetic reading. As close readers of a text are aware, there is always more than one way to read a corpus. However, in one sense the core logic of the field has not changed since the classic "content analysis" pioneered by Harold Lasswell at the end of the Second World War: the goal is to extract the main bits of communicative content from the corpus, to apply formal models to extract the principal components of the meaning (or communication) structures, and to map those onto the textual space of the corpus. According to Burke, a semantic interpretation seeks to clarify and to specify the precise and manifest communication intention of a text, in much the same way that a postal system seeks to establish a clear and unambiguous mapping of written addresses and geophysical destinations so that mail can be efficiently mapped to its proper destination. This mode of interpretation remains the central focus of text mining including network analyses. In contrast, Burke put forward the concept of a poetic interpretation as concerned, not with the thinning out of meaning, but on the contrary, with the filling out of meaning. A poetic interpretation comprehends the complex multiplicity of layered meanings and, rather than avoiding drama, envisions a vocabulary that works through drama. As we see it, the first century of textual analysis has been focused on semantic interpretation in Burke's sense. We expect that the next century will focus on the poetic. Toward this end we seek to advance the emergence of a strand of text mining that we call computational hermeneutics. The central idea is that all available text analysis tools can and should be drawn upon as needed in order to pursue a particular theory of reading. We illustrate with a series of one-mode and two-mode relational examples from our analysis of eleven US National Security Strategy statements published from 1990 to 2010. We ask, how might we apply the new computer-based tools to read this corpus just as the literary critic Burke would have read it? One example: how the network of relations among key agents, actions, and objects of concern shifted from the Clinton to the G.W. Bush administrations in framing the problem of terrorism.

Competitive cultural market: Collaborative Networks in Jazz and Metal

Stanislav Moiseev (Higher School of Economics), Benjamin Lind (Higher School of Economics)

Music industry, as a cultural production field is competitive by its nature. There are many factors which could influence on the results of competition between different musical genres and record labels and social factors should also be taken into account. For this paper, we analyze how collaboration networks within two musical fields, jazz and metal, affect record label output regarding the number of sessions recorded and the quantity of albums released. Here, we highlight the two-mode process of collaboration, whereby individuals affiliate with one another through a shared project. In addition to evaluating organizational ecological arguments in light of cultural markets, our study considers how collaborative characteristics—including bridging, closure, as well as individual-level star power—affect a

label's record production over time. We test these considerations using collaboration networks generated from online archives in addition to secondary data in multilevel models. Findings from this study contribute to scholarship on interorganizational networks, organizational ecology, and cultural markets.

Women as key nodes are losing trust, reciprocity and reputation in Mexican authorities. Warming signs for public policy on food production

Maria Guadalupe Gabriela Monsalvo-Velázquez (Universidad Azteca)

In Mexico is estimated a reduction of 25.7% in food production due to climate change, representing a deficit of 28.1% maize for domestic consumption. Institutional cooperation was looked around Conservation Agriculture (CA), as technological kit, applied analysis of structures social network maps looking for key nodes or actors to apply CA for disseminate this knowledge and fix the lack. Two analysis methods were applied: Institutional Analysis Development (IAD) and Social Network Analysis (SNA) among deepest interviews and experiment of theory games. This study was conducted in West Central Mexico with 32 municipalities, 128,584 rural production units and 11,521 farmers in four clusters. On this study 305 farmers were selected with stratified sampling with 95% of confidence level. 305 persons refer 1,270 nodes mapped. Used Ucinet and Key Player program for analysis, qualitative techniques were applied given among other results, that in the poorest cluster, according with the role, tree dimensions (social, technical and commercial) shows that the diffusers or sources actors with highest in-degrees measures were just tree nodes. When looked for identity of this tree codes, they were women. As result of qualitative tools to explain the structures of social networks maps on last zone, this women describes their own strategies to be in without appear on public spaces, they gives more value to be moral authority than a public leader, prefer results than speeches, discipline more than lose time. A new way to designed and constructs cooperation, understanding as the result of trust, reciprocity (direct and indirect) and reputation. The Men are coming back from US to the yield but even they do not want to know anything of agriculture, they continue being the owners of land, water, machinery, food and home because of public policy support this condition. Under this context, the social networks maps help to find start women as centrality nodes even in the close structures. The focus is not the number of women, the gold is found the strategic location that every woman has within her local networks and all recalibration of knowledge, codes, informal rules and steps to select the strategic connections to change conditions and move the position on the power structure to get empowerment. It have to be carry on gender equity mainstreaming in Mexican public policy.

Can influential students be effective in achieving behavior change through their social networks: evidence and challenges from two UK intervention trials

Laurence Moore (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow), Jo Holliday (Nuffield Department of Population Health, University of Oxford), Sharon Simpson (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow)

In this paper, we discuss a completed intervention trial, (ASSIST: A Stop Smoking in Schools Trial), and an exploratory intervention trial currently in progress (STASH: a peer-led intervention to prevent and reduce sexually transmitted illness and improve sexual health in secondary schools) which have sought to identify influential students and then train them to diffuse health-promoting norms and knowledge through their social networks. We discuss the methods, successes and challenges of identifying the most influential students and how to train and support them to be effective in encouraging positive health behaviours across the whole school population and including the most high risk sub-groups.

In ASSIST and STASH, a "whole community" nomination process is used to identify the most influential students in the year group. These individuals are then trained to be peer supporters and to disseminate information through their social networks. For this model to work, the nominated individuals need to have (1) influence as opinion leaders and (2) to have high reach and centrality in the social networks. The nomination process ensures that the peer supporters have influence but between them they also need to be centrally placed within the school social networks and reach across all the cliques/social groups in the school, most especially those where there is the highest risk of uptake of risk behaviour.

In the ASSIST study, behavioral data were provided at baseline and post intervention by all students. Social network data were provided post intervention by students. In this paper we analyse data from four control and six intervention schools. Centrality measures calculated using UCINET demonstrate that the ASSIST nomination process successfully

identified peer supporters who were more socially connected than others in their year and who had social connections across the entire year group including the program's target group. The results indicate that three simple questions can identify individuals who are held in high esteem by their year group and who also have the interpersonal networks required of opinion leaders to successfully disseminate smoke-free messages through their social networks. This approach could be used in other informal health promotion initiatives.

In the STASH study, where the target group is a higher risk sub-group among the school population and the subject matter is more sensitive, the methods to nominate individuals are being further evaluated. The intervention has also been substantially adapted in that peer supporters are being encouraged to use a range of online and social media methods to disseminate their norms and information, in addition to the face-to-face conversations used in ASSIST. The intervention is thus less dependent on direct social connectedness but relies to a greater extent on the influence of the peer supporters on the target population.

Amity and Enmity: A Multiplex Group Approach using Identity-Types of Ties

Jonathan Morgan (Duke University), Jaemin Lee (Duke University)

What determines amity and enmity among adolescents? Past studies have largely focused on how individual traits (e.g., race or gender), behavioral features (e.g., substance use), or local network characteristics (e.g., transitivity) affect personal tie formation. Although all these factors are important, they do not account for known group processes, specifically the role of group boundaries. Group boundaries are often realized as factions and cliques that are characterized by multiple social identities. In this paper, we examine how multiplex groups connected through social identities condition the formation of positive and negative ties. Using very unique longitudinal data that feature peer evaluations of various social identities (being aggressive, victimized, or a leader) as well as friendship nominations in a magnet school, we 1) identify groups based on friendship nominations and determine the relative mixture of social identities ascribed to group members; 2) describe how the groups stabilize or change as adolescents mature; and 3) examine the degree to which positive and negative ties at the dyadic level are shaped by ascribed identities at the group level. Our findings indicate that the dyads of amity and enmity among adolescents are greatly shaped by multiplex groups of identities, and this effect is more apparent for negative ties than positive ones. We discuss implications with respect to the literature of network formation, valued relations, and social psychology.

Two-Mode Networks Testing Connectivity and Climate Response in Andean Peru

Philip Murphy (Middlebury Institute of International Studies)

Rural farming villages in Andean Peru tend to be functionally cut off from one another, meaning that transportation between villages is a long and involved process and the endemic poverty of the area only exacerbates the functional disconnectedness of these communities. Added to this is the fact that the region is currently undergoing unprecedented issues with pests, blight, and climate-related events that greatly affect their staple crops. Despite their shared experience with these events, opinions vary as to the source of the pests, plagues and weather changes. At least some of the differences in opinion can be potentially explained by connectivity. Here, connectivity is defined as the ability to access - in terms of communication or physical visitation - other communities. A survey of seven villages (n~140) in the Andes was undertaken to explore beliefs about the climate, climate change, and responses that people take to the newly experienced adverse events in January of 2016. The resulting data were analyzed as a two-mode network using correspondence analysis and clustering techniques to account for corresponding beliefs and practices between village residents. The hypothesis being tested is that connectivity explains a correspondence in beliefs.

Globalists in the American Inner Circle

Joshua Murray (Vanderbilt University)

At the nexus of economic and political sociology, where power structure research takes place, there are two major claims about recent trends in the organization of the capitalist class generating debate- 1) U.S. focused scholars have recently posited a decline in the unity of the American capitalist class since the 1970s; and 2) globally focused scholars have argued for a rise of a transnationally unified dominant segment of capital since the 1970s. While both claims have generated their share of opponents, the one thing in common to all sides of the two debates is that most scholars treat the domestic capitalist class as distinct in form and interest from the transnational capitalist class. This

paper brings the two debates into conversations with one another by arguing that there is no sharp divide between domestic U.S. interests and transnational interests. I demonstrate this by tracing the transnational connections of the members of the executive committee of the Business Roundtable in 2011. The Business Roundtable is a domestic business policy group, yet nearly half of the executive committee can be characterized as transnational inner circle. Furthermore, these globalists at the center of the U.S. corporate elite are more likely than domestic corporate elites to serve on advisory committees for the U.S. government.

Role of structural features of egocentric networks in detection of users from groups about suicide and depression on online social network Vkontakte.com

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Recent publications used the data from online social networks to detect and diagnose depression symptoms of the users. Network features of users' profiles in such social media sites as Facebook, Twitter and Mixi proved to be the most significant in statistical and predictive models developed for that task. In this study, we investigate the capabilities of these methods and metrics applied to the Russian online social network Vkontakte (vk.com) with some improvements of research design in terms of better approaches for sampling of the users. For that purpose we've gathered data from profiles of the users from most popular communities about suicide and depression on vk.com and performed statistical tests of the difference between them and randomly sampled users. Furthermore we've built machine learning models to detect users from suicide and depression communities and evaluate the importance of different features. These models were based on binary logistic regression, decision trees and random forests. Besides standard socio-demographic attributes like age, gender, or number of friends of the user our models included structural properties of their egocentric networks, such as local clustering coefficient and homophily. Our results show not only significant differences between users from suicide&depression communities and random sample, but also good predictive quality of our models. Moreover, the structural features in general and local clustering coefficient particularly proved to be the most important variables in all of the models. Thus our findings support the crucial role of structural features of egocentric networks in detection of users from suicide and depression communities of on-line social networks. We discuss the further work on improvement of our models and transferring it to practical applications which can help to detect depression and prevent suicide.

Personality and Play: The Co-Evolution of Preschoolers' Temperament Traits and Social Play Networks

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Because preschool settings provide many new experiences with peers, they can illuminate how children's temperament traits shape social play relationships and how social play relationships shape children's temperament traits. Children's positive emotionality (i.e., positive affect, activity, sociability, and impulsivity; PE), negative emotionality (i.e., sadness, anger, and fear; NE), and effortful control (i.e., engagement, initiative, compliance, and attentional control; EC) may affect both their ability to form social play relationships and their selection of play partners. On the flip side, the traits of social play partners may influence children's own traits over time.

We collected observational measures of child temperament traits (PE, NE, and EC) and of social play relationships with peers from 53 children in two complete preschool classrooms over the course of an entire school year (i.e, four waves of data). Using a stochastic actor-based model estimated with the R package, SIENA, we (1) examined whether individual differences in child traits shape the formation of social play relationships with peers and (2) tested whether peer playmates' traits influence children's trait development over the course of the school year. Because the network relationships in this study were undirected, we used the "Unilateral Initiative and Reciprocal Confirmation Model" for undirected networks, which assumes that the creation or dissolution of each relationship in the network is initiated by one child in the dyad. Our model also controlled for sex effects, structural network effects (i.e., density, popularity, transitive triads), rate effects, and shape effects.

Results demonstrated that children's own levels of PE or EC did not have significant effects on the formation of social play relationships over time. However, for every one-unit increase in NE, children were 0.87 (i.e., $\exp[-0.14]$) times as likely to be chosen as a social play partner. There were no significant trait similarity effects for EC or NE on the

formation of social play relationships. However, for every one unit of increased similarity in PE, children were 1.86 times (i.e., $\exp [0.62]$) more likely to form a social play relationship with a partner.

There was a positive significant average alter effect of PE. Specifically, holding all else constant, comparing two children where the first child's playmates are on average one unit higher than the second child's playmates in PE, the odds of increasing in PE rather than remaining stable is 1.97 times (i.e., $\exp [0.68]$) higher for the first child than the second child. There was also a positive significant average alter effect of EC. Holding all else constant, comparing two children where the first child's playmates are on average one unit higher than the second child's playmates in EC, the odds of increasing in EC rather than remaining stable is 1.55 times (i.e., $\exp [0.44]$) higher for the first child than the second child. In contrast, there was no significant average alter effect of NE. Research and intervention implications of these findings will be discussed.

The Value of Affiliation: Dealing with valued two-mode networks

Zachary Neal (Michigan State University)

The vast majority of two-mode networks are binary. For example, a southern woman either did or did not attend a party (Davis, Gardner, and Gardner, 1941). In such cases, multiple methods have been developed for analyzing the two-mode network directly, and for projecting the network into dual one-mode networks (e.g. Brieger, 1974). Often one-mode projections of two-mode networks are used to infer relationships from individuals' patterns of affiliations. Two southern women who attend many of the same parties might be inferred to have a social relationship.

Despite an extensive substantive and methodological literature on two-mode networks, little attention has been devoted to the possibility of valued two-mode networks. For example, a two-mode network could capture not merely whether a southern woman attended a party, but how long she stayed. When using one-mode projections to infer social relationships, taking this type of information into account could be particularly valuable. An inference that two women have a social relationship is backed by stronger evidence if the two women attended the same party and stayed for the whole time, than if they attended the same party but each only stayed for a few minutes.

This paper explores how existing approaches to two-mode network projection can be adapted for use with valued two-mode data. For methods like Brieger's (1974) straightforward matrix multiplication that can be applied directly without modification, I consider the implications of using the method with valued, as opposed to binary, data. For other methods like Neal's (2014) stochastic degree sequence model, I develop a modified version that is suitable for use with valued two-mode data.

The various strategies for projecting valued two-mode networks are illustrated in the context of senate bill co-sponsorship. Typically all sponsors and co-sponsors of a bill are treated interchangeably. However, with methods that allow two-mode networks to be valued, finer-grained distinctions are possible. For example, a legislator's co-sponsorship of a bill provides some information about an alliance or ideological alignment between the legislator and the bill's sponsor ("I like your bill"), but provides weaker information about an alliance between two co-sponsors of the same bill ("I like the same bill he likes"). By taking into account not merely the presence or absence of bill co-sponsorship, but also the nature of the co-sponsorship, more nuanced inferences about political alliances and antagonisms are possible.

Networked Cultural Knowledge: Cultural Consensus and Cultural Consonance in Personal Networks

Rosalyn Negron (University of Massachusetts Boston), Linda Sprague-Martinez (Boston University), Eduardo Siqueira (University of Massachusetts Boston), Cristina Brinkerhoff (Boston University)

We report on a pilot study to test the feasibility and potential of applying cultural consensus analysis (CCA) and cultural consonance within personal networks. To date, no studies have measured cultural consensus and cultural consonance within personal networks. CCA determines whether respondents share a single mental model ordering respondents' cultural knowledge about cultural domains (e.g. illnesses, emotions, racial categories). In other words, CCA is used to assess whether there is agreement about a given cultural domain among members of a culture, and also who the most knowledgeable people are about a given cultural domain. Typically CCA is applied to a small sample of unrelated respondents thought to share the same culture. In our pilot study we assess cultural consensus among 10 members of the same egocentric network to better understand intra-cultural variation among

related individuals. Similarly, we explore Dressler's cultural consonance within two personal networks of 30 alters each. Cultural consonance, which builds on CCA, is the extent to which people's behavior corresponds with culturally agreed on prototypical beliefs. Our pilot study engaged Brazilian and Dominican transnationals in the Boston metro-area in a set of cultural domain analysis exercises to assess the relationship between cultural beliefs, behavior and health. One key question we wished to explore was whether there are differences between U.S.-based and Brazil or Dominican Republic-based alters in the extent to which they share cultural knowledge with others in egos' networks, in order to better understand the consequences of this for immigrant adjustment and well-being. We will discuss the methodological opportunities and challenges of networked cultural consensus and cultural consonance. We further discuss the potential of studying the distribution of cultural knowledge and behavior in egocentric networks using theory and methods of cultural domain analysis.

What Drives Food Truck Location Decisions? Social Contagion in Mobile Location Choice

Russ Nelson (Northwestern University)

It is well accepted that social contagion influences market entry decisions: firms observe the choices made by previous market entrants when choosing whether to enter a market and if so, where within the market to locate a new store. Mobile retailers, such as food trucks, are an interesting phenomenon because a location choice is a temporary commitment. Mobile retailers have the additional choice of whether to revisit a previous location or try out a new location. In this essay, I study the location choices of gourmet food trucks in Southern California. While gourmet food trucks announce their locations on Twitter to inform their customers, these announcements also inform their competitors. It is therefore possible to explore how firm strategies are influenced by information on rivals' choices—specifically, decisions on whether to try a new location or revisit a previously used location. To study how information on rivals' choices influences location choice, I develop a model of social contagion based on the relational events framework and then apply it to data on social networks and the location choices made by 49 Southern California gourmet food trucks over the first year of the market. The model allows me to distinguish the source of the information, as well as whether the information is received by a truck trying a location for the first time versus repeating a visit to a location. I find that firms have a strong preference for locations they have used before. The results also suggest that social contagion affects a firm's decision to both try as well as repeat a visit to a location, but the effect is stronger when a firm lacks prior experience at a location. This pattern is consistent with the notion that mobile firms use the choices of others to reduce their uncertainty regarding the profitability of a potential location.

Hybrid roles? A socio-semantic network analysis of artists and managers in between logics of fields and practices

Aleksandra Nenko (Centre for German and European Studies), Anastasia Senicheva (Centre for German and European Studies), Nikita Basov (Centre for German and European Studies)

In this paper we question how the roles of artists and managers are implemented in practice of creative collectives. There is a tradition to distinguish between these roles as defined by logics of different fields (Bourdieu, 1993). The logic of art field induces artists to seek novel modes of representation to achieve symbolic recognition (Bourdieu, 1993; Crane, 1989; Giuffre, 1999). The logic of cultural management field forces managers to act along with utilitarian and goal-oriented norms to ensure market success for artists and art organizations (Bendixen, 2000; DeVereaux, 2009). However, in contemporary artistic groups neither of these roles appears to be a product of one logic only. Joint practice of artists and managers sharing studios and involved in everyday communication and collective projects within self-run creative groups can be expected to mould hybrid roles and result in corresponding reinterpretations of the roles. In order to trace the dual impact of fields and practice on the roles of artists and managers we employ socio-semantic network analysis extending two-mode network analytical approach (Breiger, 1976) and formal analysis of meanings (Mohr, 1994; 2000) in a study of two self-run formally organized art collectives based in Madrid and Barcelona. Analyzing ethnographies, interviews, sociometric surveys and a corpus of texts by collective members we consider how the roles of artists and managers are performed and interpreted. On the one hand, the analysis gives evidence of role behaviour and reproduction of distinctions in meanings between artists and managers in accordance with the logics of fields. Activities of managers and meaning structures idiosyncratically shared by them correspond to pragmatic and efficiency-oriented norms and values imposed by the field of cultural management. Simultaneously, activities of artists and meaning structures inherent to them are focused on artistic tools and conceptual basis for art

projects. On the other hand, in both collectives we observe activities and find meaning structures different from what could be expected taking into account only the logics of fields and traditional role division. For example, managers propose specific educational art projects in Barcelona case and involve into artwork making in Madrid case. In both cases they reflect on conceptual side of art while artists dwell upon organizational sustainability of projects. Blended meanings and mixed activities give evidence that joint practice endows the roles of managers and artists with new functions and interpretations. Importantly, in Barcelona case, where the members do not involve in joint artistic practice, the role division along fields' boundaries corresponds to distinct subgroups in social network structure, while in Madrid, where all members are involved in making artworks together, the social network is more cohesive.

Fleeting friendships - The Stability of Adolescents' Cross-Race Friendships

Balint Neray (Università della Svizzera italiana), James Moody (Duke University)

This paper explores whether the racial composition of the friendship dyad influences its stability. Despite the robust evidence on interracial friendship formation, not enough attention has been paid to the stability of such friendships over time, while prior research found controversial results. We rely on a five-wave sub-sample of the PROSPER project containing 2190 students with 18868 nominations, and control for time-varying aspects of friendship. Similarly to previous studies on the topic, we use hierarchical logistic regression. Our findings demonstrate that friendship in adolescence is likely to dissolve over time, whilst the effect of racial difference on friendship retention is accounted for when the model includes controls for socio-economic status and racial heterogeneity.

Framing and Blaming: Socio-Semantics of the Eurocrisis

Adina Nerghe (Vrije Universiteit Amsterdam), Iina Hellsten (Vrije Universiteit Amsterdam)

In this paper, we analyze a combination of social and semantic networks extracted from news media articles on the recent European debt crisis. While most network research, so far, has focused on either social networks or semantic networks, we combine networks of entities (i.e., organizations and actors) and semantic networks to identify the discursive frames used to characterize these different entities. The use of socio-semantic networks in the analysis of discursive frames is a novel approach in network research. Media reporting of the financial crisis in the United States has been widely investigated by communication researchers, but the same does not apply to the European debt crisis. Since the end of 2009, several Eurozone member states were unable to repay or refinance their government debt or to bailout over-indebted banks under their national supervision. Spillover effects of the financial situation in the United States and the rising sovereign debt of several Eurozone states contributed to high financial instability in Europe. In reporting these events of the Eurozone debt crisis, the media makes use of frames to make their reports more prominent and/or popularize the issues discussed. The importance of frames in media reports stems from their ability to highlight some aspects of a perceived reality and make them more salient, while at the same time hiding other aspects. By employing frames to characterize or describe the financial situation of the Eurozone, media reports have the potential to influence perceptions surrounding the crisis, to motivate action, or to potentially create panic among their audiences.

Using semantic network analysis, the structural space approach, and parts of speech tagging, we identify different types of frames on a monthly basis in 1105 news items published by The Financial Times between October 2009 and October 2010. We show the over time evolution of frames used by The Financial Times to characterize organizations and actors (i.e., entities) in the debate relevant to the financial crisis. Our results show that the debate was only framed as a 'crisis' from January 2010 onwards, and that the similarity of correlations between our semantic networks are in a large part driven by shared concepts, but they are also driven by the structure of these networks beyond the common nodes. This means that both the content and the structure of the frame networks changes during the crisis. Our work contributes to socio-semantic network analysis by revealing the context in which entities are framed and blamed in relation to the Eurocrisis.

Structural signatures of online discussion groups and their influence on group cohesion

Jacqueline Ng (Northwestern University), Seyed Iravani (Northwestern University), Noshir Contractor (Northwestern University)

Direct replies between individuals in online discussion forums reveal rich information about group interactions. This study examines the online group discussion behaviors of 55 university students enrolled in a blended learning - part

online and part in-person - course on Organizational Behavior. For the duration of the 10-week course, students used a novel visual graphical interface, "Nebula", to conduct online discussions in randomly assigned, small groups. In particular, instead of displaying discussion posts as a traditional text-based, chronologically ordered discussion thread, Nebula - developed at Northwestern University - displays the discussion board as a network graph, where posts are nodes and replies are directed links between the nodes. Users browse and contribute to the discussion using this network interface. The goal of the study was to explore the communication patterns of groups using the online Nebula interface, and how these structural signatures influenced their group cohesion. We used ERGM to determine whether certain network structural signatures occur more or less frequently than random. Next, we computed cohesion scores for each group, by text mining their interactions. Cohesion scores were computed for different observed time periods over the duration of the course. We then used regression to assess the extent to which the prevalence of specific structural signatures were more or less predictive of group cohesion. In terms of structural signatures, we find that group members who post more frequently tend to receive more replies from others, and that gender homophily has an important effect on initiating replies in the discussion. From regression analysis, we also find that the prevalence of reciprocity, transitivity, out-degree distribution (e.g., expansiveness) and age homophily within a group's discussion network are predictors of that group's cohesion.

Boosting Tech Innovation Ecosystems in Cities, A framework for growth and sustainability of urban tech innovation ecosystems

Nga Nguyen (World Bank), Victor Mulas (World Bank), Nga Nguyen (World Bank)

Cities are emerging as hubs of technological innovation. This is characterized by an ongoing shift from technology parks in suburban areas, to entrepreneurial activity within cities. There is a global trend of startups in cities like Berlin, Buenos Aires, Mumbai and Madrid. The rise of technology startups in cities is leading to new sources of employment and economic growth, by creation of new businesses and employment categories. Traditional manufacturing and routine cognitive skills jobs are being eroded, and the creation of new sources of employment and growth is vital to maintain competitiveness, reduce poverty, and increase shared prosperity. The growth of tech innovation and entrepreneurship is not equal in all cities. Some cities experience higher, faster, and more sustainable growth than others. This research discusses what factors make tech innovation and entrepreneurship ecosystems grow faster and larger in some cities. Based on literature review, and World Bank operations, four key properties relevant to city innovation ecosystems were found: people, infrastructure, economic assets and the enabling environment. The framework revolves around the hypothesis that connections and communities are key success factor for ecosystem growth and sustainability. Networking assets, which are defined as community building events, skill training events, collaboration spaces, and networking of mentors, create and sustain these communities. The hypothesis was tested by data collected in New York city. The city was selected based on its long, representative history of tech startups development, and the active participation of key partners and city government in the research. The findings show that the social dimension, or the interpersonal connections and communities, are critical for the growth and sustainability of the ecosystem; and, that networking assets (defined as community building events, skill training events, collaboration spaces, and networking of mentors) are central to this social dimension. Based on these results, the research draws several policy recommendations that help with future World Bank operations in ICT. Policy that support ecosystems should have a community scope that overcome geographic dimension and the policy should pay attention to the development of networking assets that kickstart communities, and build networks.

Network governance and the low carbon transition - Governing sustainable energy transition in the city of Birmingham, UK

Timea Nochta (Institute of Local Government Studies, University of Birmingham)

This paper analyses the role of network governance in urban transition management, illustrated by empirical data drawn from Birmingham, UK. The issues that are of interest include the ability of the local government to establish a transition network, the ways in which this network is involved in decision making about the possible sustainable energy futures of the city, the role of central actors in the governance network and the successes and failures in delivering transition initiatives via network-based governance. Cities across Europe have committed themselves to reduce their carbon emissions by at least 20% by 2020 by signing up for the Covenant of Mayors initiative. Reduction goals are translated into local transition agendas to speed up the shift from current unsustainable energy use and production to a more resource efficient and clean supply chain. However, as energy systems have developed into

national large-scale technical systems in the past century, municipalities' capability to act is often hindered by the lack of authority and institutional capacity to govern the reconfiguration of the urban energy infrastructure. This context and the cross-cutting nature of transition projects give rise to governance experiments in which municipalities aim to engage higher levels of government, civil society and market actors to create a strong network of stakeholders engaged in local sustainable development. Network governance is seen as an opportunity to provide a relatively institutionalised framework for decision making, contributing to the reduction of uncertainty around policy decisions and enhancing implementation capacity, while maintaining a more flexible and dynamic institutional context than hierarchical arrangements. To explore the role of governance networks in Birmingham's low carbon transition, an inventory of the main actors and their involvement in local energy transition has been undertaken. Data collection methods include the analysis of policy documents and publications on transition projects which is complemented by semi-structured interviews with stakeholders to reconstruct the evolution of the sustainability agenda in the city. The collected information is visualised using dynamic social network analysis and provides insights on the form, extent, trajectory and impact of Birmingham's low carbon energy networks and their contribution to organisational change. Although the transition process is still in an early stage in the city, the data show a growing network with substantial leverage, which, however, is mainly based on informal influence rather than formal authority. The co-ordination of networks is problematic and no dedicated energy agency has so far been set up by the municipality which can be found in many of the leading sustainable cities of Europe and is often referred to as a sign of higher level of embeddedness of sustainability in the local decision making process. Nevertheless, the growing number of projects and actors involved indicate the overall success of the strategy of the municipality.

Climate Change Policy Networks in the Czech Republic: Mapping Coalitions and Conflicts

Petr Ocelík (International Institute of Political Science, Masaryk University)

Greenhouse gas emissions decreased by more than 30% in the Czech Republic between 1990 and 2012. Nevertheless, this drop was achieved mainly due to a rapid economic restructuring which led to the decline of energy intensive industries. Besides this, the Czech Republic remains to be highly dependent on fossil sources and its government recently lifted the ecological limits of brown coal mining. Moreover, app. 30% of the country's population rejects existence of the climate change. This situation hinders implementation of the climate change policies (CCP) and reinforces ideological clashes among the main actors. The research aims to explore Czech CCP networks including identification of key organizations, their coalitions, and dominant issues. The research is grounded in a discourse network analysis that allows to capture discursive interactions of large number of actors with regard to the scope and complexity of the case. For this purpose, standard exploratory techniques such as cluster analysis, community detection, and inductive blockmodelling are employed to reveal structural features of the CCP networks. The questionnaire survey of organizations is used for data collection. Based on the Advocacy Coalition Framework, data on organizational collaboration as well as organizational resources, and beliefs are collected.

Calling on Kin: The Place of Parents and Adult Children in Egocentric Networks

Shira Offer (Bar-Ilan University), Claude Fischer (University of California, Berkeley)

Close kin, particularly parents and adult children, have a distinctive role in individuals' support networks by virtue of their lifelong connections, barring any dramatic estrangement, and the extent to which people rely on them. In the present study we use new data from the first wave of the UCNets project, a longitudinal study of personal networks, life events, and health in the greater San Francisco Bay Area, to learn in an inductive way about people's intergenerational relationships. Specifically, we ask who has parents or adult children available and accessible to help them, and given that such immediate family are available, who has an active connection to them and in what ways are they connected? Recent sociological studies of familial exchanges have typically examined relations with kin in general without making a distinction between immediate and more distant kin while gerontology research has mainly focused on the parent-adult child dyad and treated it somewhat in isolation from its broader social context. Our analytic approach is different. We use an egocentric network methodology, which collects data on a person's overall connections and their characteristics and does not prompt respondents to specifically consider their ties to kin, to learn about the role that close kin play in people's personal networks. Preliminary findings underscore the particular position of middle-aged parents as a "sandwich" generation, who are highly and simultaneously involved in the provision of support to both their adult children and elderly parents. Findings further reveal the pervasiveness of gender differences in how much and what kinds of support parents and children provide one another, differences

suggestive of a gendered division of labor in generational relationships. Adult daughters were more often named as the providers of emotional support, whereas sons tended to be called upon for practical help. We do not find, however, a difference in the likelihood of mobilizing daughters versus sons during emergencies, which suggests that both may be motivated by a strong sense of filial obligation to provide support to aging parents when acute needs arise. We also find evidence for the continuing importance of geographical proximity for many aspects of filial ties, as well as the importance of emotional closeness for involvement with close kin, especially mothers and daughters. Finally, our findings suggest major class differences in the role of parents in the network. Reflecting the tendency of young professionals to frequently move in response to occupational and financial opportunities and changing labor market conditions, we found that high-income respondents were substantially less likely to live near their parents than were low-income respondents. However, after taking this trend into consideration by controlling for geographic distance, we found that high-income respondents were actually more likely to name their parents in the network. This finding is in line with research showing more frequent social exchanges among families of higher as compared to lower socioeconomic status.

Social network support and healthcare utilization, access to care, and health literacy among Somali refugees

Janet Okamoto (Mayo Clinic), Farhia Omar (Mayo Clinic), Scott Leischow (Mayo Clinic), Mohamed Abukar (Somali American United Council)

Among refugee arrivals to the U.S., Somalis were the fourth largest, and largest African, group from 2010-2012. Arizona is fourth among all states receiving Somali refugees and they represent the second largest refugee population in Arizona. Although there is a large and growing literature on health disparities among various ethnic minority groups in the United States, the literature addressing the health of refugees from the African continent is sparse. Refugees represent a unique and interesting group to assess in relation to health disparities and the role of social networks, as they are people displaced from their home countries and from familiar social networks, and often arrive to their new countries after traumatic experiences. Once arrived in the U.S., refugees must learn a new system and culture of healthcare, which is quite different from their home culture. To that end, this analysis assessed health literacy, healthcare access and utilization, and egocentric network ties among Somali refugees in the Phoenix metro area. This study examined data from quantitative surveys of Somali refugees living in Arizona (N=200). Surveys assessed egocentric network support around health issues/concerns. Other survey items assessed frequency and barriers to accessing healthcare. Thirty-eight percent of respondents reported at least one alter they could go to for advice about a health issue or concern. This is consistent with the idea that many refugees are displaced and disconnected from their social networks. Overall, those that did report having at least one alter they could go to for advice, reported close and trusted ties that they interacted with frequently. There were no significant differences between those who named at least one person they could go to for advice and those who reported they did not have anyone to go to for advice on gender, age, or self-reported general health status. Interestingly, those who reported they did not have anyone to go to for advice about a health question or problem appeared to be more likely to see a doctor for regular yearly check-ups (54.5% vs. 46.8%). Forty-eight percent of those that reported having at least one person to go to for advice also reported difficulty in understanding people because of language, whereas those that reported having no one to go to for advice had less trouble with language ($t=1.56$, $p<0.05$). It could be that those who have no close social network ties are forced to learn and understand English more quickly in order to meet their needs and communicate more often with those who are not Somali or who speak only English. Comparison of these survey findings with the qualitative focus group data that was also collected for the study could also help to explain these results further. Future directions for this work include further examining the role and influence of social networks on access to healthcare and health literacy among Somali refugees. Additional assessment of gender differences is of particular interest as the parent study oversampled for men and further studies are planned to gather additional data.

Identifying emerging research fields through community detection in scientific collaboration networks at a research university

Therese Kennelly Okraku (University of Florida), Raffaele Vacca (University of Florida), Chris McCarty (University of Florida)

Social networks of scientific collaboration among researchers are a crucial channel for the diffusion of knowledge and innovation across scientific fields. This paper uses data on scientific collaboration networks to analyze emerging

research fronts and identify innovators at a research university. We operationalize collaboration as co-authorship on publications or co-participation on research grants, using data on scientific publications and awarded grants at the University of Florida (UF) in 2008-2014 as obtained from Thomson Reuters Web of Science (publications) and from the UF Division of Sponsored Programs (grants). We use this data to construct three networks for each year in 2008-2014: (1) A publication network (nodes are UF authors, ties represent collaboration on at least one publication in a given year); (2) A grant network (nodes are UF investigators, ties represent collaboration on at least one grant in a given year); and (3) A union network (the union of the publication and grant networks). The networks range in size between approximately 3,000 and 5,000 nodes, and between approximately 10,000 and 20,000 edges, with a giant component including between 80% and 90% of the nodes in all of the networks. We use community detection algorithms to identify cohesive communities in these networks, both in the giant component and in the smaller disconnected components. We then analyze the compositional and structural stability of the resulting communities across years and types of network (publication, grant, union). As far as network composition is concerned, we are particularly interested in the composition of communities in terms of (1) researchers involved, (2) disciplines, (3) research topics (i.e. keywords), and (4) institutional affiliation of researchers (i.e. colleges and departments). As for network structure, we compare the communities across years and network types with respect to descriptive measures such as average path length, clustering coefficient, and characteristics of degree and betweenness distribution. We complement this analysis with qualitative data from semi-structured interviews with innovators (UF researchers identified by our analysis as part of an emergent research community). The goals of this mixed-methods study are (1) to assess the extent to which meaningful scientific communities are successfully identified by community-detection algorithms as applied to scientific collaboration networks at a university; (2) to uncover emergent disciplinary and interdisciplinary research fields at the University of Florida and examine their evolution between 2008 and 2014; (3) to describe the scientific and cultural context for these emerging research fronts, the individual characteristics of innovative researchers, and potential barriers to innovation and scientific collaboration at a research university.

Through the looking Glass: The networks of FIFA standing committee members

Susan O'Shea (University of Manchester), Paul Widdop (Leeds Beckett University), Peter Millward (Liverpool John Moores University)

FIFA, the governing body for world football, has a long and controversial history. Officially it is a registered charity with a non-governmental organisation status and despite managing a large economic portfolio it operates outside of corporate law and therefore accountability structures. FIFA is responsible for the world's largest and most lucrative tournaments, most notably the World Cup. World Cup participating nations have much to gain on the world stage, politically and economically, so perhaps it is unsurprising that some of the most powerful decision makers in the organisation may be swayed by motivations of self-interest or personal financial gain. In recent months there have been a series of allegations, arrests, investigations and suspensions, including indictments of high-ranking officials and executives by the FBI and a simultaneous additional criminal investigation by Swiss authorities into processes leading up to the awards of the controversial 2018 and 2022 World Cups to Russia and Qatar respectively. Both the long-standing president Sepp Blatter, and his expected successor, Michel Platini received an eight year ban from FIFA after the ethics committee began investigating allegations of corruption. Other legal and criminal investigations are ongoing. With headquarters in Zurich and 209 association members spanning six regional confederations made up of Africa, Asia, Europe, North & Central America and the Caribbean, Oceania and South America, FIFA has more associated countries than the United Nations. However, it is its organisational networks that provide us with evidence of how FIFA can be both seemingly transparent in its structures and governance practices whilst simultaneously operating in ways that promote cultures of secrecy and corruption.

In this paper we examine the network structure of the FIFA standing committees and the executive committee, many of the long-serving members of which are implicated in recent scandals. We have constructed standing committee network data from reports at two time points including most recently in 2015 and have additional time point data for executive committee membership. Full membership data overtime is difficult to acquire. In the literature on covert networks a predominant theory suggests that organisations need to weigh up relative advantages for particular network structures and suggest there is a secrecy-efficiency trade-off to consider. By using social network analysis measures examining core-periphery structure, density and centralisation measures we can assess the positions and roles that appear most important in the organisation and begin to understand how a network like FIFA may continue to benefit a corrupt powerful few despite a supposed anti-corruption restructuring. This dataset has been included in

the Leverhulme Trust funded covert networks project at the Mitchell Centre for Social Network Analysis, University of Manchester.

Positional analysis of multiple networks with actor attributes

Antonio Rivero Ostoic (Aarhus University)

With an effective way to include actor attributes in the relational structure, this presentation extends the notion of Compositional Equivalence for multiple networks developed by Breiger & Pattison (1986). The relevant acquired attributes are integrated into a single partially ordered semigroup structure that describes the role interlock of the system, and the substantial interpretation of the network takes the diverse algebraic constraints in such structure where both ties and attributes are interrelated. Like the authors, the process is illustrated with the Florentine families' network dataset together with the actors' wealth.

Network periphery, group boundaries, and the 40 individuals in the 'Toronto 18' terrorist network

Marie Ouellet (Simon Fraser University), Martin Bouchard (Simon Fraser University)

Defining boundaries of illicit networks presents one of the major challenges in mapping covert organizations. Yet measures of network size are often presented as fixed, notably the case of the Toronto 18, a terrorist group that was widely stated to consist of 18 members. The scope of networks is influenced by the available evidence, the individuals present at the operational stages, and those who are actually detected. However, adopting a broader view of co-offending allows for a better understanding of all the steps that go into the preparation and execution of complex crimes, which has been shown to be particularly salient in a terrorism context. This study draws from interviews with an individual formerly embedded in the Toronto 18 conspiracy group and court documents covering two years of criminal proceedings, which allowed us to map the evolution of the network over time. Findings demonstrate that the Toronto 18 network goes beyond the core members charged, with 40 individuals either directly or indirectly involved in the conspiracy. Considering these affiliates shows that the network evolved not as a single cohesive unit, but was structured around four communities. Assessments of these densely connected subgroups highlighted the ringleaders' distinct ways of managing the network, serving as precursors of the group's eventual split into two independent factions, and its transition into a major terrorist conspiracy in Canada.

The context and contents of cyberbullying

Anthony Paik (University of Massachusetts-Amherst), Marizen Ramirez (University of Iowa)

Most of what is known about cyberbullying, in terms of its prevalence, risk factors, and links with offline bullying, violence and delinquency, draws heavily on single surveys, which limit researchers' ability to examine actual cyberbullying communications or the peer group contexts of the behavior. The research in this presentation employs social network analysis and text analysis methods to examine the contexts and contents of cyberbullying. Data were based on a sample of approximately 190 middle-school students who were administered surveys in two waves in 2015. Students were drawn from two primarily white schools in the Midwest, but one had a significant concentration of Native Americans. We also collected social network data from participants and captured electronic communications sent via text messages and on Facebook and Twitter platforms. This presentation reports on the frequency of cyberbullying in our sample, based on the contents of students' electronic communications and self-reported information on bullying experiences. We also present initial descriptive results regarding the social networks of these adolescents, structural positions associated with offline and online bullying, and characterize the contents of cyberbullying messages.

Measuring organizational network capacity among state-level nutrition incentive networks

Ligia Paina (Johns Hopkins University School of Public Health), Pamela Surkan (Johns Hopkins University School of Public Health), Anna Kharmats (Johns Hopkins University School of Public Health), Julia Pon (Wholesome Wave), Leah Johnson (Wholesome Wave)

The National Nutrition Incentive Network (NNIN), coordinated by Wholesome Wave, currently operates nutrition incentive programs at farmers markets in 31 states and the District of Columbia. These programs provide a monetary

incentive to low-income customers who spend their federal nutrition benefits at participating farmers markets on healthy, fresh, locally grown fruits and vegetables. Wholesome Wave invests in the development of some of the networks, while others develop organically. However, Wholesome Wave currently does not know whether and how networks change over time and how network capacity differs.

Our research pilot explores how state level nutrition incentive networks are structured and how network capacity develops in two states where NNIN programs are being implemented - New Hampshire, where Wholesome Wave developed the network, and Vermont, where the network has developed organically. We began to address our research questions using a mixed methods approach. Our team has conducted in-depth interviews with network leaders of the organizations implementing nutrition incentive programs in order to understand how they define network capacity and how they view barriers to and opportunities for scale-up. Based on the qualitative findings, we have conducted the first round of the online network survey, to develop baseline quantitative network measures. Specifically, we are analyzing various resource exchanges (information, financial resources, non-financial resources), as well as joint planning and collaboration. In addition to looking whether any exchange happens, we also explore the frequency of interactions and the quality of the relationships between network organizations.

The findings contribute to a better understanding how to define and measure organizational network capacity. Furthermore, it will help network coordinators and technical assistance providers, such as Wholesome Wave to understand how networks change over time and how to strengthen their capacity to promote the scaling-up of programs, such as nutrition incentives. Finally, a follow-up survey will be administered to the same sample in the spring of 2016, providing an opportunity to explore whether and how the case networks change over time.

Bridging the Gender Divide: The Effect of Informal Status on the Structuring of Women and Men's Networks

Andrew Parker (Grenoble Ecole de Management), Ajay Mehra (University of Kentucky), Peng Wang (Swinburne University of Technology), Stephen Borgatti (University of Kentucky)

Organizations at their heart are social structures made up of connections between employees. These connections are influenced by the formal structures of the organization such as departments and hierarchical ranks as well as by the way in which work flows through the organizations. These connections are also influenced by the preferences of individuals. For example, individuals who are sought out for advice by many others are seen as having high status and tend to attract others to them. Likewise, individuals have a preference for homophily that results in them making ties with people like themselves. While there is considerable research that examines each of these processes individually we know less about how homophily and informal status processes combine together to influence the overall social structure of intra-organizational networks. In this paper we theorize about how men and women structure their networks in relation to their own gender but also with individuals of the opposite gender. We suggest that having bridging ties to individuals of the opposite gender will have a negative effect on an individual's informal status within their own gender group. However, when women have ties to men of high informal status it positively affects their informal status within their own gender group. We also expect the same effect to occur for men. We test out hypotheses on a dataset comprising of 72 individuals (38 men and 38 women) in a large consulting firm. To analyze our data we use a multilevel exponential random graph model (ERGM). These models allow for the control of multiple different network processes (e.g., reciprocity, transitivity, etc.) enabling us to test whether our processes of interest (e.g., status and brokerage) influence the development of the social structure within an organization. In addition, using a multilevel model allows us to control for different network processes within each gender group and between genders. We find support for our hypotheses and discuss implications for theory and practice.

"How much he earns? Really?" Relational wages comparison as a stratification social process on labor market.

Elise Penalva-Icher (Paris Dauphine, PSL Research University)

In the USA, The National Labor Relations Act (NLRA) guarantees most employees in the private sector the right to talk about working conditions, including remuneration, with coworkers. Besides, Internet offers apps and quizzes to guess coworkers' salary. Why is there a need to do so? What is at stake in outing coworkers' wages? The NLRA is, in that case, a tool to fight gender or race discrimination; it stands against pay secrecy clause that helps shadowing inequalities. But beyond legal prosecution, these wages comparisons are an indicator of a broad phenomenon. They

reflect a social process of stratification on the labor market. This process is a relational process as the comparison takes place in the relational structure and egos' network. Indeed, former categories to say who you are in the organization and how much you earn due to your position are nowadays undermined: one life job become scare, mobility is more and more experimented in one's career, competition has increased on the labor market. Consequently, workers look for signals to interpret their position in their organization or at an inter-organizational level, comparing to other firms. We argue that they find these signals through their personal networks. People look for information about how much their coworkers, brothers or sisters, former schoolmates, that is to say in a more general way peers, are paid. To do so, they use their personal network to make an homophilious relational comparison (Festinger, 1954; Cartwright, Harary, 1956; Heider, 1946). We offer to examine this social process on a specific fieldwork: bonus and variable remuneration accorded to managers in the private sector in France. Indeed, since the 1990's, those kinds of bonuses had been increasingly in used in France, introducing market competition between workers, as they are legitimated by and calculated with the performance of individuals or teams. We collect with an Internet survey a sample of 1195 managers gathering information about their careers, bonus (amount, structures, uses etc.) and their remuneration satisfaction. We also ask them with whom they are discussing about how much they are paid, and if these contacts were in contact together to retrace their personal network (direct and indirect contacts). We have data about the strength of the tie and the characteristics of the contact (who is it?). First results show the importance of the comparison, people not comparing are more satisfied (half of the sample). With comparison, satisfaction reduce, but the more you compare (many direct contacts), the less unsatisfied you are. These first results underlines the necessity to understand who are the people comparing and those who are not, and the importance of examining who are the significant peers you compare to. References: Cartwright, D., & Harary, F. (1956). Structural balance: a generalization of Heider's theory. *Psychological review*, 63(5), 277. Festinger, L. (1954). A theory of social comparison processes. *Human relations*, 7(2), 117-140. Heider, F. (1946). Attitudes and cognitive organization. *The Journal of psychology*, 21(1), 107-112.

“Friends and supporters of psychotherapy” revisited: Interactions between lay and professional networks in recovery from mental illness

Brea Perry (Indiana University), Erin Pullen (Indiana University), Bernice Pescosolido (Indiana University)

In “Friends and Supports of Psychotherapy: On Social Circles in Urban Life,” Charles Kadushin (1966) demonstrated that every step in the process of deciding to enter mental health treatment - from defining symptoms to seeking referrals for therapists - was shaped by the culture of one's lay community networks. Since this article was published in the flagship sociology journal, empirical work has continued to suggest that both lay and professional supporters play a critical role in health services utilization and recovery from an episode of mental illness. A large literature in counseling psychology has examined the influence of provider characteristics and the therapeutic alliance on treatment outcomes (Adams et al., 2007; Cruz & Pincus, 2002). In parallel, sociologists have established the importance of friends, family members, and other informal caregivers in shaping an individual's illness career, focusing largely on the resources flowing through networks (Perry & Pescosolido, 2015; Pescosolido, Gardner & Lubell, 1998). However, these two lines of research have seldom been integrated to examine formal and informal networks in tandem or in interaction.

In this research, we revisit and extend Kadushin's classic work on overlapping social circles, examining how the lay social network context can moderate the influence of perceived provider characteristics on recovery outcomes as the illness career unfolds. To achieve this goal, we address two research questions, drawing on a longitudinal sample of people entering mental health treatment for the first time: First, we identify whether perceived social support functions of treatment providers - including emotional support, informational support, and being a trusted confidant - are associated with more positive recovery outcomes over time. Consistent with contemporary views on recovery, we emphasize development of a positive self-concept, return to former social roles and identities, and optimism about one's ability to manage serious mental illness in the future (Markowitz, 2001). Second, we examine whether the relationship between perceptions of providers and recovery outcomes is contingent on characteristics of the broader lay network context in which providers and mental health clients are socially embedded. In conceptualizing the informal social safety net, we focus on the level of support accessible through lay members of the network and the network's cultural orientation toward medical professionals.

Data are from the Indianapolis Network Mental Health Study - a longitudinal dataset investigating illness and social network dynamics among first-time mental health clients. We find strong and significant interactions between lay

network characteristics and provider characteristics in the recovery process. Positive provider relationships are more beneficial for recovery when the level of social support provided by the lay network is low (i.e. professional support can substitute for a weak lay social safety net). Also, we find that positive provider relationships facilitate recovery when the lay network culture is pro-medical, but impede recovery when the lay network is hostile to medical professionals. In short, the effectiveness of a strong therapeutic alliance on recovery as mental health clients move through the illness career is dependent on the functional and cultural characteristics of lay community networks.

Network connections of gang members in a homeless youth street network and related risk taking behaviors

Robin Petering (USC School of Social Work), Amanda Yosida-Maxwell (USC School of Social Work), Jaih Craddock (USC School of Social Work)

Background: Research has revealed that 17% of homeless youth (HY) have ever identified as a gang member. For the majority of these youth, identification as a gang member precedes experiences of homelessness. Therefore most youth enter a HY street peer network either with former or current ties to gangs. It is unclear whether a HY's identification as a gang member is related to personal or structural network attributes after they enter the street network. Additionally, for HY it has been consistently shown that network ties in the street peer network is directly related to either risk or protection for many behaviors. The current study explores network characteristics and connections of homeless gang members within a street network and how this is related to risk taking behaviors.

Method: Socimetric network data was collected from a sample of 671 HY. Youth were categorized into four groups based on personal gang status and the presence or absence of a tie to at least one gang member. Multivariable logistic regressions tested the overall effect of gang status and being connected/not connected to a gang member compared to non-involved youth with no gang connections with various types risk behaviors including substance use, sexual risk, violence and suicide.

Results: Gang members were not significantly different than non-members across network variables including being isolates in the network and were similar in regards to the majority of risk taking behaviors. Multivariable logistic regressions revealed that gang members with no connections to other gang members in the network were at greater risk for engaging in sex under the influence, lifetime exchange sex, ecstasy use, chronic marijuana use, suicide attempt, suicide ideation, intimate partner violence and injury related to violence. Gang members who were connected to other gang members had greater odds of experiencing partner violence. All three groups that in some form included a gang connection were more likely to engage in unprotected sex compared to non-members with no gang connections.

Discussion: Analyses revealed that these connections for gang members are closely related to risk taking behaviors. Gang members were indistinguishable in regards to risk compared to non-gang members. However, when examining the effects of a gang connection related to personal gang status many differences were revealed. It appears that being a gang member without gang connections is the most risky of groups. It is possible, for gang members in the HY network, having a connection to another gang member may actually be a protective factor. Additionally for certain behaviors, including partner violence, seemed to be related to gang membership status regardless of connections. For sex under the influence, gang involvement- either as a connection or self-identification- appeared to increase risk. Future research should explore these findings as it is possible that having connections to other youth with similar experiences in gang status may abate risk in a street network. It is also possible that isolating oneself from other gang members is a coping mechanism for desisting gangs and is an indicator of greater risk when on the streets.

Advice-seeking among Colorectal Cancer Control Program grantees, 2011-2012

Miruna Petrescu-Prahova (University of Washington), Peggy Hannon (University of Washington)

Colorectal cancer (CRC) is the second leading cause of cancer deaths among men and women in the United States. CRC screening reduces cancer deaths by detecting cancers at an early stage and by detecting and removing precancerous polyps before cancer develops. However, people without health insurance or a regular health care provider are more likely never to have been screened. To increase colorectal cancer screening rates among all people over age 50, with the goal of increasing the percentage of people who have been screened as recommended regardless of income or health insurance status, the Centers for Disease Control and Prevention (CDC) received funding to support a Colorectal Cancer Control Program (CRCCP) in 25 states and 4 tribal organizations from 2009-2014. Grantees used

any of five evidence-based interventions (EBIs) recommended in the Guide to Community Preventive Services (client reminders, small media, reducing structural barriers, provider reminders, and provider assessment and feedback) to try to reach this goal.

Between 2011-2014, a CDC evaluation partner designed and fielded an annual grantee survey that measured CRCCP grantees' provision and promotion of screening. In 2011 and 2012, this survey included the following question: "What other CRCCP programs do you go to for advice or support to use the five Community Guide-recommended, evidence-based interventions to promote screening?" The purpose of this study is to describe the 2011 and 2012 advice networks among CRCCP grantees and to examine the association between a grantee's position in the advice networks and the number of EBIs it implemented.

We used descriptive social network measures to characterize the networks, and exponential-family random graph models (ERGMs) to examine the association between network position and EBI implementation. Our results show that in 2011, the pattern of advice-seeking among CRCCP grantees was related to the number of EBIs the grantee implemented, as well as a tendency for grantees seeking advice to both reciprocate requests and form clusters of advice-seeking. Programs that implemented a higher number of EBIs had a higher tendency to ask for advice, controlling for all other effects. There was no association between the tendency to receive requests for advice and the number of EBIs a program was implementing. In 2012 however, the pattern of advice-seeking was largely explained by the existence of a previous relationship in 2011, although there was a tendency to reciprocate advice requests even controlling for this effect. These results suggest that encouraging advice-seeking among grantees may lead to long-lasting, mutual support relationships in this group. This, in turn, has the potential to support the sustainability of CRCCP efforts and promote its goal to provide and promote colorectal cancer screening to people in need.

Overcoming entrepreneurial project failure: social networks influence

Liudmila Petrova (NRU Higher School of Economics), Valentina Kuskova (NRU Higher School of Economics), George Beknazar-Yuzbashev (NRU Higher School of Economics)

We investigate the impact of entrepreneurs' social networks to negative emotions caused by, and learning from failure generated by failed projects, together with affective commitment of entrepreneurs to their organizations after a project failure. Even though project failures are common and "time heals all wounds" (perhaps, reducing the negative emotions from the project failure), it "heals" differently depending on the strength of specific coping orientation, and the fact that the "wound" may be shallower for those who perceive their organization to normalize failure (Shepherd, Patzelt & Wolfe, 2011). Up to now, nobody has investigated the impact of entrepreneurs' networks in these circumstances - in other words, how a social network might absorb some of the shock experienced from the project failure or help mitigate the resulting negative emotions. Failure is believed to be an important experience from which learning can take place. Project failure, in particular, is a common occurrence, especially for those in entrepreneurial projects (Burgelman & Valikangas, 2005; Shepherd & Cardon, 2009; Sminia, 2003). Because failure "upsets the status quo" (Chang & Baum, 2003) and leads decision makers to search for possible solutions (McGrath, 2001; Petrovski, 1985), researchers have suggested that organizational members can learn more from their failures than from their successes, including engineers (Petrovski, 1985), scientists (popper, 1959), and managers (Sitkin, 1992). Entrepreneurs' personal inter-relationships and social networks can facilitate overcoming project failure. This project extends the existing research by Shepherd, Palzelt & Wolfe (2011) by adding another dimension - networks - to their research model on the relationship between coping mechanisms and overcoming the project failure. Data was collected on over 80 entrepreneurs in Russia at different stages of overcoming a failure of at least one project. Results indicate that networks play an important role in overcoming the project failure. Conventional wisdom may lead one to believe that having a strong network might allow the entrepreneur to overcome the failure more effectively; this research indicates that it is actually not so. It is not necessarily the strength of the network, but rather its composition, that plays that role. We outline theoretical mechanisms that explain the relationship between network composition and overcoming the project failure, describe the composition of the most effective networks, and provide practical implications of our research in the full paper.

Tackling User Bias in Social Media to Increase Prediction Validity of Political Opinions

Juergen Pfeffer (Carnegie Mellon University), Fred Morstatter (Arizona State University)

Social media data offer great opportunity to study opinions and behavior of millions of people in real time. However, several challenges arise when social media data are used at scale to describe human behavior. For instance, it has been shown that different social media platforms over-proportionally attract people based on socio-demographic variables. Consequently, collected data from these platforms do not represent actual populations. However, most studies ignore these facts and do not account or correct for biases related to the user base of social media platforms. Also, more and more studies and surveys report large numbers of non-human accounts creating massive amounts of spam data that introduce noise into the analysis. These and other aspects make it hard to use social media data to gain insights into people's opinions in a way that represents the true population that we wish to study. In this talk we present first conclusions from an experimental study in the context of the elections to the German state parliament of Baden-Wurttemberg. We tackle user bias with a couple of different approaches. First, we identify different types of users, e.g. politicians, party activists, journalists. Second, we create a social media panel to analyze change of behavior or opinion of selected users over time. Third, we use opinion polls for calibrating and weighting our observed analysis. Fourth, we study the effect of very specific localized data collection on the amount of spam and bots in the data. Finally, we interact with selected users to collect relevant socio-demographic information.

Using Ego-Centric Networks to Evaluate the Impact of a Suicide and Alcohol Use Disorder Intervention for Rural Yup'ik Alaska Native Youth

Jacques Philip (University of Alaska Fairbanks), Tara Ford (Aleutian Pribilof Islands Association), David Henry (University of Illinois at Chicago), Kirk Dombrowski (University of Nebraska-Lincoln), Stacy Rasmus (University of Alaska Fairbanks), Jim Allen (University of Minnesota)

Alaska Native people experience significant health disparities in suicide and alcohol use disorders (AUD). Even though it has long been known that social factors are key determinants of suicide and AUD risk, the role of social networks in suicide and AUD risk remains understudied, and network studies are particularly lacking in American Indian and Alaska Native suicide and AUD research. Further, most social network research focuses on risk, with few studies exploring the relationship of social networks to protective factors, or how social network properties can be used as outcomes in intervention research, as well as in the study of an intervention's model for the process of change. Qungasvik is a Yup'ik word that can be translated as 'toolbox.' The Qungasvik intervention is a universal, multi-level, community-based preventative intervention for rural Yup'ik Alaska Native youth. This adaptive intervention is composed of a toolbox of modules from which community planning groups can select on the individual, family, and community level. Each module provides an activity grounded in Yup'ik cultural practices and values that promotes a distinct subset of individual, family, and community-level protective factors from suicide and AUD risk that were identified through previous research (Allen et al., 2014). Other previous research (Phillip et al., 2015) used principal component analysis to identify specific structural and compositional social network statistics that loaded on four components (size, density, connections to adults, and connections to elders), and then applied partial least square path modeling to establish relationships of these components with family and community level protective factors from suicide and AUD risk that the Qungasvik intervention seeks to promote. Using ego-centric social network data collected from Yup'ik adolescents who participated in the Qungasvik intervention at pre- (n=50) and post-intervention (n=36), we used bootstrapping to compute non-parametric 95% confidence intervals of the change in pre- and post-intervention network statistics scores. At post-intervention, all network statistics composing the density component, and all but one of the network statistics composing the connections to adults component were significantly higher. Change in scores related to network size and connections to elders were non-significant. We interpret these findings as demonstrating the Qungasvik intervention produced positive change in some but not all social network characteristics associated with protection against suicide and AUD risk in Yup'ik youth. This study is, to our knowledge, the first use of social network data as an intervention outcome variable with an American Indian and Alaska Native population. Additionally, its findings are suggestive of the broader utility of social network variables in the study of protective factors in contrast to risk, and in studies of intervention effectiveness in the prevention of suicide and AUD risk.

The Formation and Evolution of State Emergency Operations Plan Networks

Nolan Phillips (University of California, Irvine), Cedar League (Trauma, Health and Hazards Center, University of Colorado, Colorado Springs), Britta Johnson (Trauma, Health and Hazards Center, University of Colorado, Colorado Springs), Jeannette Sutton (University of Kentucky), Carter Butts (University of California, Irvine)

In the United States, states regularly release Emergency Operations Plans (EOPs) that delineate which organizations (state, federal and civil) are responsible for particular types of tasks (e.g.; debris removal, evacuation) during disasters or other disruptive events. These tasks are classified into fifteen standard Emergency Support Functions (ESFs), such as Public Health, Communications, and External Affairs. The same fifteen ESFs are present in nearly all states' EOPs, in accordance with the federally mandated National Incident Management System. However, states' EOPs vary both in the number of organizations that are included in their plans and the average number of ESF assignments for each organization. These differences raise important questions regarding disaster management organizational networks: How similar are these networks across states? How do these networks change over time within a state? Are there common state features that account for these changes? This research answers these questions by examining the differences and similarities across states' EOPs. Moreover, it elucidates the factors that influence the evolution of these networks over time for states where we have been able to obtain multiple plans. We analyze EOPs from all states that had their plans available or responded to requests for their documents. We use the documents to construct two-mode networks comprised of organizations and ESF assignments. Basic network statistics show that the density decreases in almost all of the graphs (for states with multiple plans) as states consistently add new organizations to their plans. Additionally, we assess the impact of shocks to the networks (e.g.; hazardous events occurring within a state and changes in governors). We utilize these features to understand better what drives the initial formation and subsequent evolution of these organization to ESF assignment networks by using two-mode exponential random graph models (ERGMs). Our ERGMs evaluate the influence of organization's type and scale; organizational lineage; quotidian functions; and federal institutional pressure. We then utilize the ERGM coefficients found for each plan to simulate networks for all other plans; these simulated networks are then compared to the original network using Hamming distance. This approach enables us to deduce how organizational characteristics influence the formation of these similarly and differently across states and time. Finally, we perform a meta-analysis of ERGM coefficients to determine whether or not exogenous shocks and state characteristics (such as size, population, and political party of the governor) influence the formation of these networks similarly. Our findings shed light on the development of disaster management organizational networks, and on bureaucratization processes more generally.

The Evolution of Health International Nongovernmental Organization Networks

Nolan Phillips (University of California, Irvine), Matthew Pearce (University of California, Irvine)

International nongovernmental organizations (INGOs) have proliferated rapidly since the end of World War II along with the subsequent rise of global governance institutions. Some view the INGOs as benevolent, or at least good intentioned, actors seeking to ameliorate global inequality; others view the INGOs as usurping local authority over domestic issues and further propagating a global hierarchy. These contrarian views have spurred debates regarding the impact of INGOs, and the research emerging from these debates has begun to examine the structure of the INGO and intergovernmental organization (IGO) networks. Researchers have concluded that the INGO network is become increasingly stratified by examining the networks' density and countries' eigenvector centrality. However, the number of countries and number of INGOs has increased over this time period, which makes the density comparisons problematic. We build off of the prior research by focusing on the entire structure of the health INGO network. To do so, we perform an Eigen decomposition of the adjacency matrices from 1960 to 2005. This produces eigenvalues and eigenvectors, which better illuminate the overall structure and changes of the health INGO networks. Taken together, the health INGO networks are becoming increasingly flat such that participation is becoming increasingly equal rather than stratified. These findings have important consequences for our understanding of the evolution of these networks and their potential impacts on health outcomes.

Creating a Network for Chronic Disease Management: The Atlantic Healthcare Quality Improvement Collaborative

Kaye Phillips (Canadian Foundation for Healthcare Improvement), Thomas Valente (USC), Keesa Elicksen (Canadian Foundation for Healthcare Improvement), Jennifer Verma (Canadian Foundation for Healthcare Improvement), Amar Claudia (Canadian Foundation for Healthcare Improvement)

We created a regional quality improvement network among team members from six provinces to determine if this network can be sustained after project staff are removed. We administered surveys to program participants at 3 waves at the second, third, and fourth (final) workshops approximately 6 months apart. Three networks were measured: awareness, sharing information, and collaboration; and provincial location was recorded for each respondent. Density

more than doubled for all three networks and ties between provinces increased significantly over time. Joint attendance at workshops was associated with the creation of new ties among program participants. This study documents the steps and procedures followed to create an inter-provincial quality improvement collaborative for the treatment of chronic diseases. This initiative demonstrates that quality improvement networks can be created and that participants value the networking such program foster.

Network Exploration by Complements of Graphs with Graph Coloring

Frederick Kin Hing Phoa (Institute of Statistical Science, Academia Sinica)

Network data have become very popular with the growth of technologies and social applications such as Twitter and Facebook. However, few visualization tools are created for exploring large-scale networks. We propose a simple and quick procedure to explore a network in this study. The algorithm changes the edge representation based on the complement of a simple graph and the partition method of vertex coloring. Furthermore, the colors provide additional information on top of the partitions. Our proposed method is demonstrated in some famous networks.

Peer leaders' demographic and sociometric characteristics influence alters' intervention exposure in the Sources of Strength suicide prevention program

Trevor Pickering (University of Southern California), Thomas Valente (University of Southern California), Peter Wyman (University of Rochester)

The Sources of Strength (SoS) suicide prevention intervention trains peer leaders to act as intervention champions within their high school community. It is known that opinion leaders can diffuse information quickly throughout a network, but less is known about how specific network metrics, demographic characteristics, and participation habits influence the amount of diffusion to peers. Knowing the characteristics of peer leaders with the most diffusion can help future intervention iterations deliver the program more effectively. Baseline surveys were used from 6,543 students in 20 schools participating in the SoS program. There were 552 staff-selected peer leaders with a range of 10 to 64 leaders per school. Students were asked about their friendship ties (i.e., list up to 7 of your closest friends) at their school and demographic characteristics (i.e., grade, gender, and ethnicity). Intervention outcomes included 1) having knowledge of SoS through a friend, 2) discussing specific strengths with a friend, 3) seeing a presentation or assembly about the SoS program, and 4) participating in an SoS activity, poster, or internet site. Mixed models with a random intercept for school were used to estimate the effect of network characteristics, demographics, and knowing another peer leader on the percentage of peer leaders' friends exposed to each intervention outcome. While grade and gender did not affect exposure outcomes, peer leaders of white ethnicity had a higher percentage of alters who knew about SoS ($\beta=9.3\%$, $p=.003$) and participated in a SoS activity ($\beta=5.3\%$, $p=.04$). Network metrics (i.e., normalized in-degree, out-degree, and betweenness) generally did not appear to have an effect on exposure outcomes, but peer leaders with a higher normalized in-degree had a higher percentage of alters who knew about SoS ($\beta=13.2\%$, $p=.04$). Peer leaders who named at least one other peer leader as a friend had a higher percentage of alters who knew about SoS ($\beta=5.9\%$, $p=.009$), discussed SoS with a friend ($\beta=8.1\%$, $p<.001$), and participated in an SoS activity ($\beta=5.1\%$, $p=.02$). It is believed that a Key Players algorithm can maximize effectiveness by dispersing leaders throughout the school population. However, as demonstrated here, peer leaders with friends who are also peer leaders have a greater percentage of alters engaged in the SoS program. White peer leaders may have friends who are more engaged in the program or may have better avenues of information exchange with other students. Peer leader characteristics did not affect school-wide exposure (e.g., seeing an assembly about SoS). Future methods of peer leader selection should be sensitive to peer leader ethnicity and encourage peer leaders to train in friendship dyads.

Ego-Network Characteristics and Transportation Mode Choice Conformity

Susan Pike (University of California, Davis), Louis Lubow (University of California, Davis), Mark Lubell (University of California, Davis)

In this paper we utilize ego-networks to explore the effects of relationship types, tie-strength, and network properties on network conformity in transportation mode choice. While social influence has been found to play a role in transportation mode choice, the influence exerted by some connections may be greater than others, and there may be

a greater tendency towards conformity within denser or closer networks. At the same time, there is uncertainty about what types of relationships may be most influential. We might expect an ego to conform to the transportation mode choice of their closest friends; as these individuals likely exert a greater influence than other connections. However, it is also plausible that an ego conforms to the transportation mode choices of colleagues or classmates, especially if there is a particular mode choice that is used by the majority of such connections. In this paper we analyze the extent to which egos conform to the transportation mode choices of others in their networks, and identify network properties and relationship characteristics that are more closely related to conformity in transportation mode choice. We hypothesize that in general, the more contacts or alters within an ego's network using a particular mode of transportation (regardless of which), the more likely it is that the ego uses that mode. Further, denser networks are likely to have higher conformity than less dense networks. We also expect networks with many strong ties have more conformity than networks with few strong ties. Within networks, we expect the ego to conform to the transportation mode use of those with whom they have closer relationships.

In this paper we also evaluate several means of defining ego-network conformity to transportation mode choice. We explore conformity across our sample of ego-networks towards particular modes, such as bicycling; i.e. the proportion of each ego-network that bicycles. We also utilize measures of conformity related to the patterns of mode use particular to each ego-network. For example, the majority of some ego-networks may drive, while the majority of other ego-networks may take the bus; thus it is of interest to consider the proportion of the ego-network that uses the most popular mode of transportation, or the total number of transportation modes utilized within each network. For each means of measuring conformity we explore the ego-network properties and tie characteristics that contribute to greater conformity.

A challenge for this analysis is self-selection; individual characteristics that influence the properties of, or types of relationships within ego-networks may also influence mode choice of individuals in the network. We address this potential for endogeneity by controlling for characteristics of the ego, including attitudinal statements related to their propensity to seek out social acceptance as well as the extent to which they receive transportation information from social connections. Understanding the nuances of social influence and conformity related to transportation mode choice within social networks enables sustainable transportation programs to focus on the most relevant social network strategies to improve participation, or encourage the use of sustainable modes of transportation.

Who needs an alter anyways? Using the ego-centric relational event model to analyze teams in open communication networks

Andrew Pilny (University of Kentucky), Scott Poole (University of Illinois), Jeff Proulx (University of Illinois), Ly Dinh (University of Illinois), Mufan Luo (University of Illinois)

Recently, network researchers have taken advantage of modeling networks as relational events, rather than as relational states (e.g., QAP, ERGM, SIENA). Relational event modeling (REM) has a number of advantages, namely being able to model each network interaction at each specific time point. However, REM largely resembles an information-based theory of communication that has received heavy criticism in the field. It fails to account for when everybody is the alter or when no alter is specifically the target in a network. In these "open" communication networks (e.g., Facebook status update, same Walkie Talkie channel, group Snapchat), everybody is the receiver or individuals chose to be an alter of a message that any ego can generate.

To overcome this limitation, we use Markov chain modeling and the recently developed ego-centric REM developed by the statnet team to analyze a multi-team system (MTS) experiment in which the communication network was open. That is, when somebody sends a message, there is no predetermined receiver, everybody in the MTS can hear it (or chose to ignore it). Results indicate that groups enacted different patterns and that there was a significant interaction effect between cross-team turn taking and MTS coordination. MTS coordination was measured as the extent to which the MTS was successfully able to orchestrate their charge to a common area to neutralize insurgents. The results replicate earlier results in which dyadic REM was used when a more restricted network condition was manipulated.

Assessing the Fragility of Global Trade - The Impact of Localized Supply Shocks Using Network Analysis

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Anecdotal evidence suggests the existence of specific choke points in the global trade network revealed especially after natural disasters (e.g. hard drive components and Thailand flooding, Japanese auto components post-Fukushima, etc.). Using a highly disaggregated international trade database we assess the spillover effects of supply shocks from the import of specific goods. Our goal is to identify inherent vulnerabilities arising from the composition of a country's import basket and to propose effective mitigation policies. First, using network analysis tools we develop a methodology for evaluating and ranking the supply fragility of individual traded goods. Next, we create a country-level indicator to determine each country's supply shock vulnerability based on the composition of their individual import baskets. This indicator evaluates the potential negative supply shock spillovers from the import of each good.

Depression, Network, and Community Effects on Trajectories of Adolescent Marijuana and Alcohol Use

Michael Pollard (RAND)

This paper examines how aspects of both peer and broader community-level network substance use behaviors predict developmental trajectories of marijuana and alcohol use among adolescents, and how depression moderates the links. We use longitudinal data from The University of Illinois Bullying and Sexual Violence Study from 2009-2014 tracking students from grades 9-11 in three public schools in Illinois. We identify distinct sets of developmental trajectories of marijuana use and trajectories of alcohol use using latent class growth analysis, and link baseline social network characteristics to distinct trajectories, interacting depression with peer and community substance use.

We anticipate that network structure and network composition - particularly degree centrality and the proportion of substance using friends - will predict use trajectories, indicating that early social network characteristics have long lasting implications and predict behaviors over a critical developmental period. Further, depression during adolescence is expected to moderate the effects of peer and community use on personal trajectory.

Preliminary results identify five developmental trajectories of marijuana use, and five trajectories of alcohol use. These preliminary results further demonstrate that local peer tie drinking behavior predicts membership in certain marijuana and alcohol use trajectories, but not all of them. Further, depression significantly moderates the role of community level substance use for both marijuana and alcohol use.

Assessing the Implementation Strength of Health Message Dissemination Networks in Uttar Pradesh, India through Egocentric Snowball Sampling

James Potter (Boston University Center for Global Health and Development), Jenny Ruducha (Boston University School of Public Health; Braintree Global Health)

We present a rapid mixed methods evaluation of the Implementation Strength of the Uttar Pradesh Community Mobilization Project (UP CMP), a large scale community mobilization project in rural Uttar Pradesh, India to change key health behaviors associated with mortality risk for mothers and newborns. The project's strategy involves the dissemination of health messages through women's self-help groups and the strengthening of linkages between the community and the public health infrastructure. This evaluation measured the ground-level implementation of the UP CMP through an analysis of snowball sampled egocentric networks (Ego N = 61, Alter N = 89), combined with qualitative interviews and observations of SHG meetings. Individual ego networks were also combined using unique identifying data to construct partial sociometric networks that describe the effective reach and redundancy of message dissemination networks. Results were combined with qualitative interview data to evaluate the effectiveness and constraints of message dissemination and outreach strategies of the UP CMP.

Effect of Anticipation of Interaction with an Informed Third Party in Ultimatum Games

Yana Maria Priestley (NRU HSE), George Beknazar-Yuzbashev (NRU HSE)

How do individuals act knowing that they will be judged by someone well-informed of behavioral norms? Do they behave differently anticipating a later interaction with that someone, and does the amount of information available to him matter? We tackle these questions in a simplified setting of an ultimatum game.

The game has been extensively studied from many angles, including the situation where players anticipate an interaction with another party. The main focus, however, has been on the effects of anticipated interaction with, or

feedback from, either experiment assistants or opponents in the game. We attempt to add to this body of literature a study of anticipation of interaction with a third party (one of the players in the game but not a direct opponent) and of the effect of the amount of information available to it. For that purpose we use a network perspective and construct an experiment where players participate in an anonymous ultimatum game anticipating an interaction with an informed third party. In addition, the quality of the information depends on the characteristics of the network created for the purposes of the experiment.

Our goal is to see whether when making a decision individuals take into account the amount of information on similar decisions available to third parties who are able to observe this decision and with whom the individuals anticipate a later in-person interaction. In other words, we want to observe whether individuals in an ultimatum are influenced not by interaction with a third party, but by anticipation of such interaction, and whether the strength of the influence depends on the amount of information the third party has about decisions of other players.

Collaboration Networks and Structural Influence in Mental Health

Jeffrey Proulx (University of Illinois at Urbana-Champaign), Chengyu Fang (University of Illinois at Urbana-Champaign), Justin Mozelle (University of Illinois at Urbana-Champaign)

In the field of behavioral health the Diagnostic and Statistical Manual of Mental Disorders (DSM) is the primary, authoritative information source used when detecting psychopathology and determining treatment recommendations throughout the Western Hemisphere. The DSM is written, published, and revised by the American Psychiatric Association. To create each edition, a task force of content specialists is assembled to share expertise and select the disorders included in each edition of the manual. In this study we argue that this task force is a multi-level collaboration network that can be used to model evolutionary mechanisms of change. Using data derived from archival sources, this analysis attempts to empirically model network change using an evolutionary framework. Over the 71 years of the DSM's existence, seven distinct collaboration networks have been formed to create seven editions of the DSM. This study reports on a longitudinal analysis of these seven collaboration networks. In aggregate, these networks account for 664 members of the task force and model the evolutionary mechanisms of variation, selection, and retention over the life span of the DSM system. Exponential random graph models are used in conjunction with sequence analysis to address the structural and sequential nature of this evolving system. Preliminary results are presented along with discussion of model fit.

Assessing the evolution of the DSM is a challenge uniquely suited to network methods as relational changes to this system have a direct medical and financial impact on patients, providers, and organizations. Previous research on the DSM task force has focused almost exclusively on actor ties to funding sources and has only addressed recent editions of the DSM. This study intends to inform an evolutionary explanation of multi-level networks and add a structural perspective to the literature concerning the DSM.

The Beauty of Ivy: When Inequality Meets Equality

Julia Ptaschunder (The New School, Department of Economics)

Thomas Piketty's (2014) *Capital in the 21st Century* revolutionized economic thoughts on inequality. Started by the 2008/09 World Financial Crisis and cumulated in the subsequent Occupy movement, attention to rising inequality regarding economic wage, opportunity and wealth led to advocacy for a more equal society. Innovatively, this article argues for a mixture of equality and inequality within a societal network holding value when access to opportunities to transfer implicit wealth is distributed merit-based. By the example of Ivy League educational institutions, but also elaborating on social environments and interaction networks, a novel economic wealth transfer model is proposed. Within an economic system, dyads of unequal crystallized value based on heritage (e.g., royal families, legacy admits) and merit-based equality represented by offspring from families with underprivileged backgrounds, whose outperforming ambition, fluid intelligence and drive may lead to fruitful social interactions and beneficial wealth transfers, may create beneficial economic outcomes. On the societal level, within networks favorable environments may serve as transformation hubs if entered merit-based by underprivileged families. While presenting a preliminary idea of an economic model of value transfer between equality and inequality, the article outlines a blatant research gap on information about the direct and indirect transactions and interactions between equality and inequality representing agents within societal networks. The article concludes with giving hope in Piketty's outlook of rising inequality by showing the economic merits of inequality when paying attention to merit-based distributed value transfer opportunities.

Ego Network Predictors of Help-Seeking for Oral Health Problems Among Mexican Immigrants to the American Midwest

Erin Pullen (Indiana University Network Science Institute), Gerardo Maupome (Indiana University), Brea Perry (Indiana University), Eric Wright (Georgia State University)

Compared to many ethnic groups in the United States, Mexican immigrants (MAs) have diminished health care access and face substantial barriers to accessing needed services. This may have significant public health consequences given the large and growing size of this nationality/ethnic minority. However, little research has examined how MA social networks may shape their use of different types of health care, including dental care services. This is noteworthy given the unmet oral health needs of this population, and the unique characteristics of their networks. The TalaSurvey Study targeted 332 Mexican immigrants living in the Midwestern USA. Using these data, we examine the significance of both individual and egocentric network characteristics on the use of, and attitudes toward, dental care service utilization. Specifically, in addition to individual sociodemographics and oral health status, this paper considers the role of network characteristics that may have particular relevance for ego help-seeking. These include the size of individuals' oral health networks, their level of dental knowledge, and the frequency with which they discuss acute dental problems with these ties. Our findings reveal the positive effect of ego-level factors, including educational attainment and having dental insurance, for enabling access to dental treatment and office visits. Importantly, this research draws attention to network characteristics that are significantly correlated with help-seeking behaviors. Findings indicate that network size, the proportion of the network that had seen a dentist in the prior year, and the frequency with which egos discuss acute problems with network ties positively correspond to use of dental care services. Conversely, embeddedness in networks where ties are perceived as having low levels of knowledge about dental issues, and in which ties tend to hassle egos about dental issues, are associated with lower odds of using dental care services. This research is among the first to use ego network data and methods to examine how alter characteristics may shape oral health behaviors among this underserved population. NIH DE022096-01A1, IU CTSA UL1TR001108, RR025761.

The sensorial map of the city from social-networking data

Daniele Quercia (Yahoo Labs), Luca Maria Aiello (Yahoo Labs), Rossano Schifanella (University of Turin)

Our daily urban experiences are the product of our perceptions and senses, yet the complete sensorial range is strikingly absent from urban studies. However, smell and sound have a huge influence over how we perceive places, they impact our behavior, attitudes and health. Not knowing what smells and sounds exist in cities may result in partial views of the collective image of our urban areas, the proliferation of clone towns (as smell and sound contribute to the city's identity), and in reinforcing socio-economic boundaries, as smell and sound that provide insights into the social life of cities are used (often unconsciously) as invisible markers between neighborhoods with different socio-economic status.

We propose a new way of capturing nuanced olfactory and auditive perceptions of cities from data implicitly generated by social media users. The idea is to search for smell and sound-related words on social media content. We first build dictionaries of smell and sound-related words. We conducted "smellwalks" in a variety of cities: participants were exposed to a range of different smellscape and asked to record their experiences. As a result, smell-related words have been collected, and enriched with words available from previous studies on smell, thus creating the first dictionary for urban smell. Similarly, to obtain a sound-related dictionary, we collected sound-related words from previous literature on sound and from crowdsourced online data.

For both Barcelona and London, we collect geo-referenced picture tags social media. We match those tags and tweets with the words in the smell and sound dictionaries. To create a structure for a large and apparently unrelated dataset of words, we cluster the co-occurrence network where nodes are smell/sound words and undirected edges are weighted with the number of times the two words co-occur in the same pictures as tags. Emerging clusters show that smell and sound-related words are best classified in ten and six macro-categories, respectively. Air quality indicators (measured by the amount of pollutants that are emitted in the atmosphere by several human activities) correlate with specific smell categories. Similarly, noise levels correlate with specific sound categories.

Cities have a unique smell and sound profiles that fluctuates in time. We find that cities have a distinctive smell footprint that is layered on a scale of smell "notes", ranging from the most pervasive and persistent to the most

rare and ephemeral. Smell/sound pleasantness correlates with the sentiment expressed by city dwellers. Based on the literature, we are able to know the smells and sounds people like or dislike. We find that locations with pleasant sensorial perceptions tend to be associated with geo-referenced tags conveying positive emotion recorded in the same areas, while locations with unpleasant smells tend to be associated with negative emotion tags.

With our work, we hope to contribute to the growing body of literature on how people sensually experience the city and to empower researchers and city managers by offering them methodological tools and practical insights to re-think the role of senses in their work.

Who does not want to sit next to you in class? Educational performance and social rejection of children of immigrants in Europe

Isabel Raabe (Nuffield College, University of Oxford)

Past studies on educational inequality in Europe have documented diverging educational success for youths with a migration background. Classic status attainment literature has explained educational success by various factors, including the socio-economic background of the parents. This can manifest itself in various ways, ranging from the availability of actual financial support throughout the educational career, to background-specific aspirations and the perceived value of education. Another important factor is the social and human capital that is transmitted through the parents: strategic knowledge about the education system, about manners, values and cultural codes that prevail at school, and access to networks of support and inspiration that promote learning and performance. It is likely that these aspects of social and cultural capital are less uniformly available to children of immigrants in comparison to their ethnic majority peers. Their parents, migrants themselves, are more likely to lack these types of resources, rendering both the quantity and quality of social relations and connections at school more critical and decisive for their educational career. In this paper, I focus on social rejection at school and ask a) whether this kind of social rejection is associated with lower school performance, and b) whether this in particular can account for lower grades of children of immigrants. I use egocentric network data on school classes from England, Sweden, and Germany from the Children of Immigrants Longitudinal Survey in four European Countries (CILS4EU), to measure social rejection in four ways: through ego-reported bullying, alter-reported bullying, not wanting to sit next to an individual in the classroom, and the lack of friendship nominations. Initial analyses using linear regression models indicate that, indeed, social rejection has a negative effect on educational performance for everyone, and some preliminary evidence shows a stronger effect for youths of some, but not all, ethnic groups. Results are most unambiguous for Sweden, which is likely due to higher data quality. Since further investigations are required to elucidate those findings, I use multi level p2 models to analyse networks of social rejection in Swedish classrooms, in order to investigate the effect of social rejection of minority youths by their majority peers of high socio-economic background.

Testing Higher-Order Network Structures in an Online Experiment

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Currently, the de facto representational choice for networks is graphs which capture pairwise relationships between entities. This dyadic approach fails to adequately capture the array of group relationships that are more than the sum of their parts and prevalent in real-world situations. For example, collaborative teams, wireless broadcast, and political coalitions all contain unique group dynamics that need to be captured. We propose the use of simplicial complexes to model these supra-dyadic relationships in networks. We argue that a number of problems in social network analysis such as network-wide broadcast and collaborative teams can be elegantly captured using simplicial complexes in a way that is not possible with graphs. In this study, we develop a laboratory experiment which tests whether groups of human subjects perform better in simplicial complexes or in equivalent, graphical networks. For the experiment, we adapt the Wildcat Wells framework developed by Mason and Watts (2012). In this framework, individuals search for the most oil and are able to learn about the location of oil from their neighbors. We operationalize five network types representing equivalent simplicial and graph-theoretic networks. We then run subjects in these networks and measure how much oil subjects in each network discover. The results support our hypothesis that simplicial complexes capture empirical differences when subjects in the simplicial conditions perform better than their counterparts in graph-theoretic networks.

Assessing the degree of partnering between informal and formal Sectors

Robert Raeside (Edinburgh Napier University), Tao Chen (Edinburgh Napier University)

In times of austerity there is a continued drive to deliver public and social support services in a cost effective manner - often reduced cost and still maintain or improve the efficacy of service. A major initiative "The Integration of Health and Social Care" is being launched throughout Scotland in spring of 2016 to enable and enhance co-operation and resource sharing amongst the formal sector of health providers and local authority social care departments and informal bodies often voluntary organisations with the aim of providing a better and more caring service to both the community and those who provide care. This plan has similarities with asset based community development, which has been effective in community regeneration in the US and in many developing countries. However, there are a number of problems in the deployment of this plan, it is not clear how many informal organisations there are, what resources they have and who they communicate and partner with. It is here that a social network analysis approach might be useful. It is hypothesised that if data is collected by a sociometric approach then a map of which organisations communicate and an inventory of the resources they have can be developed. Resources are both physical such as meeting space, equipment and transport but also intellectual such as knowledge on handling difficult people and how to apply for funding. It is the investigation of this that is reported in this paper. In 2015 a study was conducted on community integration in a local authority region of Scotland, East Dunbartonshire. A database, Milo maintained by the umbrella organisation Scottish Council for Voluntary Organisation was used as a starting point to identify third sector organisations and a questionnaire developed to gather information on organisational ties which an organisation has. It was hoped that a sociogram could be developed and the importance, taking centrality measures as a proxy, and reach of the organisation identified. Unfortunately response rates were poor - there were thought to be in the region of 750 informal organisations - but many were found to either have closed or merged or details held on the database were incorrect. Also some organisation did not respond not considering themselves to have a role in health or social care - such as a local history society - yet be providing a forum for people to meet and interact they do provide an important community service to social well-being. The data collection methods were changed to face to face data collect and a reasonable response rate was achieved. The analysis of the data is discussed and it is shown that by the application of SNA tools insight into the operation of the community can be gleaned. We conclude that SNA is a useful approach to identify community based assets and can be used in an evaluative way so assess the successes of the programme to integrate health and social care and if it is indeed beneficial to the community.

"SEEKING TO LEARN" VERSUS "SEEKING TO TEACH": IMPACTS ON TIMELY TASK PERFORMANCE

Roopa Raman (Clemson University), Varun Grover (Clemson University)

This study investigates how individuals can use their social networks to accomplish 'timely task performance' in a work environment where their own tasks are increasingly interdependent and tightly coupled with the tasks of others, causing delays in their tasks to not be entirely within their control. We take a novel agency-based perspective of advice networks to consider the differentiated social structures through which people actively solicit advice ("seeking to learn") versus actively contribute unsolicited insights ("seeking to teach") to facilitate timely task performance. Results from 2-level hierarchical linear modeling in the healthcare context show that while central positions in both types of networks are important, the types of centrality that are salient across the two networks are different. In advice-soliciting ("seeking to learn") networks, people seeking advice to help resolve problems in their tasks are best positioned to complete these tasks in a timely manner when they can serve as brokers or gatekeepers of the requests for advice that are flowing through the network (high betweenness centrality positions). In contrast, unsolicited advice givers (in "seeking to teach" networks) can best achieve timely task performance when their indirect contacts are within relatively close reach (high closeness centrality positions) and their direct contacts are highly influential or popular (high Bonacich power centrality positions).

Who Bullies Whom? Level and Direction in Single-Grade and Multi-Grade Classrooms

Ashwin Rambaran (University of Groningen), Marijtje van Duijn (University of Groningen), Rene Veenstra (University of Groningen), Jan Dijkstra (University of Groningen)

Power imbalance plays a crucial role in understanding bullying in elementary school classrooms (Salmivalli, 2010). So far, most research focused on the effects of child characteristics (e.g., gender and age). Yet, little is known

about the effects of classroom characteristics (e.g., context and grade). Besides single-grade classrooms, multi-grade classrooms - where students from different grades are taught by the same teacher in one room at the same time - are widespread in the Netherlands, and are formed for administrative or pedagogical reasons (Veenman, 1995). The aim of the current study is two-fold: 1) to investigate whether single-grade classrooms and multi-grade classrooms differ in level of victimization, and 2) to explore the roles of age/grade, gender, and network positions in victimization in these classroom contexts.

From a power imbalance perspective (Rodkin et al., 2015), it can be argued that particularly in multi-grade classrooms the younger students (i.e., who belong to the lower grade) are victimized by the older students (i.e., who belong to the higher grade) because they form a more easy target. Alternatively, from an evolutionary perspective (Ellis et al., 2012) it can be argued that in mixed-age settings the younger students are less likely to be victimized by the older students. In addition, compared to administrative multi-grade classrooms we expected to find lower levels of victimization in single-grade classrooms and particularly pedagogical multi-grade classrooms. We tested these expectations with statistical network analysis.

Data were derived from KiVa Netherlands, a project aimed at reducing bullying in elementary school classrooms (i.e., Grades 3-6; age: 8-12 years). For the current study, only data from the control schools were used. 11 single-grade ($N=274$), 9 administrative multi-grade ($N=216$), and 6 pedagogical multi-grade ($N=156$) classroom networks containing victimization ties ("Who starts bullying you?") are available. We analyzed each classroom network separately with ERGMs (Wang et al., 2009), and summarized the results per classroom type in a meta-analysis (Viechtbauer, 2010).

Descriptive findings show that on average victimization was twice as low in pedagogical multi-grade classrooms ($av.density=.02$) compared to both administrative multi-grade classrooms and single-grade classrooms ($av.densities=.04$). In addition, findings from the statistical network analysis show that despite lower levels of victimization in pedagogical multi-grade classrooms, traces of power imbalance based on grade were detected ($b=0.87, ns$): in two classrooms lower-grade students were likely to be victimized by higher-grade students. By contrast, in administrative multi-grade classrooms same-grade victimization was more likely ($b=0.08, ns$) than cross-grade victimization ($b=-0.61$ and $b=-0.64$, $ps<.10$) reducing the presence of power imbalance based on grade. In single-grade classrooms, however, power imbalance was likely based on gender with girls being victimized primarily by boys ($b=0.42, p<.10$). All three classroom contexts were similar in network structure and age did not explain victimization. Although the results should be interpreted with caution due to the small sample size and accordingly marginal significance levels, the present indicated findings indicate that gender and grade play a different role in victimization across single-grade and multi-grade classrooms.

Sexual Minorities' Peer Network Characteristics and Behavioral Change Across Adolescence

Nayana Ramirez (The Pennsylvania State University)

We know very little about where sexual minority adolescents fit in the world of peer networks. The research that exists typically has been limited by low sample sizes, and longitudinal data on sexual minorities' peer networks is often not available. This study is among the first to examine how the peer network characteristics of sexual minorities differ from those of their heterosexual peers and how these differences relate to behavioral differences across adolescence.

Past studies have found that sexual minority male adolescents tend to have smaller peer networks than heterosexual male adolescents, and that sexual minority females have larger peer networks. Cross-sectional studies also show that sexual minority adolescents differ in their patterns of cross-gender friendships. Sexual minority male adolescents tend to have a greater number of opposite-gender friends, yet sexual minority female adolescents have similar a number of female friends compared with heterosexual girls.

In this study, I assess whether these patterns vary across adolescence using the PROMoting School-community-university Partnerships to Enhance Resilience (PROSPER) longitudinal study. I examine the evolution of sexual minority adolescents' peer networks from sixth through twelfth grade using a variety of network characteristics and their role on a variety of behavioral outcomes, including deviance and substance use. PROSPER includes survey data from two consecutive cohorts in 28 schools in Iowa and Pennsylvania, beginning in the fall of sixth grade and continuing in the spring of each subsequent year through the 12th grade with additional annual surveys through age twenty. The dataset allows analyses to include an average of approximately 9,000 students for each of the study's eight waves. At each wave, respondents were able to name up to seven of their same-grade friends.

Using multilevel models, I examine whether differences exist between sexual minority and sexual majority adolescents' network characteristics, including overall rates of friendship (outdegree, density), popularity (indegree), and reciprocity in friendship ties. Second, I examine how these differences in network characteristics are related to sexual minority adolescents' behavior by gender.

Preliminary results show that sexual minority males ($b = -0.250$) and females ($b = -0.191$) have a smaller in-degree compared to their heterosexual peers of the same gender. Both sexual minority males and females are less likely to be central within their networks and sexual minority females have a smaller out-degree than sexual majority females. Figure 1 shows that sexual minority males have fewer friends of the same gender ($b = -0.311$) compared with sexual majority males. Additionally, I find evidence of a changing relationship between an individual's proportion of same-gender friends over time and his or her involvement in delinquent behavior.

The Structural Patterns of International Trade: A Network-based Approach

Olaf Rank (University of Freiburg), Clarissa Goertz (University of Freiburg)

Following Ricardo's theory of comparative advantage it has frequently been suggested that any two countries will engage in bilateral international trade even when one of the partners is more efficient in producing every single good than the other. While comparative cost advantages may explain the emergence of dyadic trade relationships between pairs of countries, the theory fails to offer an explanation for the structure of the entire trade system as being represented by the collectivity of all trade relationships between countries. Based on network theory it can be argued that the individual trade relationships do not emerge independently from each other. Instead, it is legitimate to assume that a specific trade relationship between any two countries i and j will potentially depend on all other trade relationships the two partners possess. It has been previously shown that tie interdependence is likely to result in structural patterns characterizing the network. Because some of these patterns can be observed more or less frequently than one would expect in a random network, the collectivity of structural patterns can be referred to as a network's structural logic. In this paper, I examine the structural logic of the global trade network in 2014. Applying a class of exponential random graph models (ERGMs) I investigate to what extent interdependencies between individual trade relationships result in the emergence of stable trade patterns that characterize the network. The results reveal a number of interesting findings: (1) The trade network is characterized by strong tendencies for mutual trade (reciprocity), in which in line with Ricardo's argument two countries mutually export goods to the partner. (2) There are strong tendencies for both in- and outward centralization suggesting that there are countries that export goods to several partners while others import from multiple partners. (3) Tendencies for transitivity and simultaneously against structural paths emphasize the local aspect of international trade thereby reflecting the increasing importance of regional trading blocks at this time.

The Balance Theory of Sentiment Relations: An Elaboration and Test

Craig Rawlings (Northwestern University), Noah Friedkin (UC – Santa Barbara)

The sentiment relation exists in all human interactions as a signed cognitive orientation of one individual toward another, and it exists in all groups of acquainted individuals as a network of signed cognitive orientations among the group's members. Balance theory attends to network structures of sentiments and posits that these structures alter over time in response to individuals' efforts to locate themselves in social positions that are tension free. In small social groups, where all individuals have a positive or negative orientation toward every other member of the group, these efforts are constrained to sign changes of orientation. The theory is structural in its treatment of tension as a property of the configuration of sentiments, and is supported by a body of empirical findings. However, the nature of its key sentiment conversion mechanism and its scope conditions are untested in naturally occurring groups. This paper elaborates this mechanism by postulating that balance theory's projected macro-level shifts are contingent on stronger community-like settings in which changes of sentiment are triggered by the interpersonal tensions of particular configurations of sentiment relations, and their resolutions are oriented toward greater reductions in structural imbalance. We find support for this assertion among urban communes from the 1970s.

Does sharing support Inuit food security? New insights from food sharing networks.

Elsbeth Ready (Stanford University)

This research examines the relationship between food security, food sharing, and household socio-economic status in the Canadian Arctic, in order to determine how traditional food sharing networks contribute to the well-being of Inuit households and to better understand the potential impact of climate change on Inuit communities. The results are based on food security assessments, qualitative food sharing network data, and household economic data collected in a survey conducted in a small Inuit community in Nunavik (Northern Quebec, Canada) during 2013-2014. Exponential random graph modeling of the food sharing network data, using other household social and economic variables as model parameters, show that contrary to popular belief, Inuit food sharing does not prioritize needy (i.e., food insecure) households. On the contrary, the ERGM results, as well as regressions on household egocentric network characteristics, indicate that food sharing, affluence, and political power are closely interconnected, a pattern that reflects high levels of socio-economic inequality and the existence of poverty traps within the community. The results suggest that households that are already food insecure will likely be the least resilient to reductions in the availability of traditional foods and other stresses that may accompany climate change. This research thus emerges as a challenge to human dimensions of climate change research that relies on conventional anthropological “wisdom” about the function of Inuit food sharing and untested assumptions about the egalitarian nature of Inuit society. In particular, means-tested policy approaches will be required to deal with the current Arctic food security crisis as well as with the future consequences of climate change.

Insights for Peer Based HIV Prevention for homeless youth from a 2 year panel study of whole networks

Eric Rice (University of Southern California), Harmony Rhoades (USC), Hailey Winetrobe (USC), Amanda Yoshioka-Maxwell (University of Southern California), Jaih Craddock (USC social work), Robin Petering (USC social work)

Objectives: Network-based HIV prevention models like POL promote HIV testing. Implementation of POL has proven challenging in some contexts. To inform implementation, we examined two networks of runaway and homeless youth (RHY) overtime to assess how social ties impacted HIV testing practices. **Methods:** Data were collected from two populations of RHY recruited from drop-in centers in Los Angeles, every six months for one year (Network 1: n= 237, 263, 312; Network 2: n=138, 149, 131). For each panel a sociomatrix was generated based on youth nominating other youth in the sample. Eigenvector centrality, which models prominence with respect to direct and indirect ties, was used to assess if more network centrality was associated with reports of past 6-month HIV testing.

Results: In both networks, a consistent structure was observed overtime despite high turnover in individual membership in the networks. For network 1, 44% returned in panel 2, and 42% repeated between panels 2 and 3. For network 2, 18% returned in panel 2, and 14% repeated between panel 2 and 3. In Network 1, more central positions were associated with increased reports of recent HIV testing in all waves and in wave 2 and 3 for Network 2.

Conclusions: Despite the transience of particular network members over time, highly central positions in RHY networks are consistently occupied by youth who reported more HIV testing. Network-based HIV prevention interventions that target HIV testing, such as POL, may be effectively implemented if highly central RHY are recruited as peer leaders.

Conspiracies as Structure and Perception

Georg Rilinger (University of Chicago)

Recent scandals such as VW's manipulation of emission-rates, the bribery schemes in the upper echelons at FIFA or Madoff's Ponzi-scheme reveal how ubiquitous criminal conspiracies are. But even though there are case studies of conspiracies scattered across different literatures and there is a growing area of sustained research into 'dark' networks, a general theoretical framework has yet to be formulated. Moreover, even though the literature has produced some insights into the basic principles behind the organization of such networks, there has not been much work about how they are discovered. Most studies reconstruct the conspiracies from individual investigations, which makes it impossible to account for variations in external scrutiny. But secrecy is a relational phenomenon: we cannot look at the actions of the perpetrators alone to understand deceptions, but must also examine the particular way the audience engages with them. Since this particular interplay has not yet been studied for larger conspiracies, few attempts have been made to articulate a general conceptual framework or study the reasons for the discovery of conspiracies. This paper examines different investigations of the same historical conspiracy to make some headway towards addressing both issues. In 1932, one of the largest utility empires of the US collapsed. Even though earlier

investigations had not been able to find anything, the investigators now revealed widespread financial fraud at the heart of the Chicago based 'Insull Group'. Several state and federal investigations were conducted, but even now the officials failed to discover a key fact: prominent bankers in Chicago's main loop banks had been active participants of Samuel Insull's criminal conspiracy. The paper asks how the conspiracy initially managed to remain secret and why, when it was finally discovered, the bankers were able to get away nonetheless. To address the first question, the paper reconstructs the network of conspirators as well as the network of company transactions implementing the fraud. It then examines the relation between network structure and the search behavior of the investigators, and shows that the internal organization of the deception was adjusted to particular forms of external scrutiny, but not others. Conclusively, the secrecy/efficiency tradeoff that is usually seen as animating the organization of a conspiracy cannot be specified abstractly but only in relation to particular audiences. The second part of the paper examines the search behavior of the officials during later investigations to determine why only parts of the conspiracy were discovered. This more hermeneutical analysis complements the network analysis and helps to develop a more general conceptual framework that links work from microsociological studies about secrecy with insights from the literature on dark networks. The goal is to find a framework that can account for the relational character of secret-keeping as well as the structural factors that determine who gets in contact with what kind of information. In conclusion, this paper combines a network analysis of the relation between a historical conspiracy and its environment with a hermeneutical investigation of its partial discovery to develop a conceptual framework for thinking about conspiracies.

Predicting the Emergence of Dark Criminal Leadership through Social Networks and Social Media

Tracey Rizzuto (Louisiana State University)

Research on "dark" (covert and illegal) leadership suggests behavioral patterns and antecedent factors that predict who within a social system might emerge as an influencer, power-broker, or—in the realm of organized crime—a member of a violent gang. The identification of criminal gang members derives from unsystematic, time-consuming, and labor-intensive investigative processes that could benefit from more comprehensive, systematic data-driven or quantitative predictive analytics. This research is a validation study that presents the effectiveness of predictive models for identifying criminal offenders likely to emerge as members of violent criminal gangs. Data were extracted from over 11,000 criminal records from Homeland Security Information Network (HSIN) archives (2012-14) for one high-crime U.S. metropolitan community over a two-year period. Three time-lagged periods were demarcated (Period 1 12-months; Period 2 12-months, Period 3 24-months) with variables at Time 1 (start of each period) used to predict individual-level gang membership of criminal offenders at Time 2 (end of each period). Predictor variables including online social media presence (dummy code), a violence propensity score (number and severity of violent crimes), and different network centrality metrics will be entered into a Cox Regression (Survival) Analysis model to predict the likelihood of being qualitatively identified by HSIN as a known or suspected gang member at Time 2. This mixed-methods approach to the predictive detection of dark leadership will: (a) estimate the importance of social media presence and prior violence behavior for predicting future gang behavior, and (b) weigh the relative utility of three forms of network centrality for understanding the emergence of "dark" gang members over time. Findings from this study applies knowledge about leadership networks to intelligence-driving violence reduction strategies, and extends previous research on ways that leaders influence others through network centrality and the use of online messaging thereby demonstrating ways social networks and social media may be used to forecast the evolution of dark members in organized gang networks. Implications for "smart policing" strategies that build upon local law enforcement and academic research partnerships are discussed.

Unlikely Affiliations: Donor-based Connections Between Congressional Senators Elected, 2012

Christiana Robbins (Annenberg School for Communication and Journalism, University of Southern California)

This study examined how FEC-registered donations to the 33 Congressional senators elected during the 2012 election cycle formed a politician-to-politician network. In this network, a tie between two senators indicated shared donor(s). The strength, or weight, of the tie increased as the number of shared donors increased. The webs of relations between newly elected and re-elected senators of the 113th Congress was compiled, visualized, and analyzed in order to detect communities that exist based on shared donors. It was hypothesized (H1) that all senators would have ties to at least one other member of the network. It was also hypothesized (H2) that cliques based on shared donors across

multiple individuals would be present in the network. Both hypotheses were supported.

Data originated from the website of the Center for Responsive Politics and was made available by the MapLight Foundation. R was used for analysis. The original .csv file contained approximately 30,000,000 pieces of data divided into 81 categories; each row represented one transaction between a donor and a recipient. People running for the House of Representatives and people who lost the campaign were filtered out; multiple transactions from a single donor to a single politician were collapsed into a total sum amount. The bi-partite network (donors tied to senators via monetary transactions) was reshaped into an undirected, unimodal network (senators tied to one another via shared donors). The final network consisted of ties between senators weighted according to the number of shared donors. All the 33 senators were connected to one another with shared donors, regardless of party affiliation or gender. Each senator had a degree count of 32. In other words, across party and gender lines, everyone was connected to everyone else by at least one donor, within one step. H1 was supported. However, the ties varied widely in strength, from a weighted score of 6 to a weighted score of 7032. To detect cohesive subgroups, “fastgreedy” community detection, clique detection, and triangle detection were run; however, none of these tests revealed any significant results. R was not able to differentiate subgroups because collapsing the graph into a unimodal network with weighted edges resulted in no more than one tie (a summation of all shared donors) between each dyad, despite the fact that the strengths of these ties varied widely. As an alternative, the node-to-node relationships were sorted according to the weight of the relation’s edge and portions of the 528 edges were gradually excluded based on their absolute deviation from the median using the median absolute deviation standard. This method allowed subgroups—as determined by heavily weighted ties, i.e., many shared donors—to appear naturally.

At 90% edges removed, two communities became apparent, a three-member chain of Republicans and a large, heavily interconnected nine-member cluster of Democrats, with one Independent on the outskirts of that group. H2 was partially supported. The results reveal that though divides by political party are still present, money has formed its own network strong enough to override typical Republican versus Democrat differences.

Migration of researchers to new research communities: the use of social network analysis to tackle integration in structured communities and the ripple effect on these communities

Guillaume Roberge (Science-Metrix)

In a world where the mobility of people has never been more prominent, the migration of researchers has become mainstream, particularly in the academic field. These migrations may be the outcome of parameters such as the search for better salary treatment or new career opportunities, although studies demonstrate that once an adequate salary is reached researchers tend to move to foreign institutions predominantly for new work opportunities rather than for the need to improve their long-term career prospects. This is unlike the behaviour observed for other professionals. As these mobile researchers join their new institutions, new cooperation partnerships can emerge as researchers integrate into their new research communities, often resulting in the publication of scientific articles. By using co-authored publications as evidence of a link with other researchers in the network it is possible to prepare social network analyses (SNAs), which can provide valuable answers to many interesting questions. For instance, upon reaching their new institutions, do these individuals fill existing gaps in the research communities by collaborating with many researchers previously disconnected in the networks? Do they instead start working within already well-developed clusters? Or do they create their own new clusters of research, acting as seeds for new communities in the networks of these institutions and mostly avoiding collaborations with their new colleagues? We propose to present SNAs based on a set of researchers who migrated to new institutions in foreign countries, using these analyses to track their integration in the networks and to assess the impacts of their arrival on the network communities within these institutions. Using standard network indicators (e.g., eigenvector centrality, network density, shortest path), we will discuss the integration process of a set of researchers and present the means to highlight the impact of these newly integrated researchers on the collaboration networks within their institutions. These migrant researchers will be identified using a method we have developed that tracks changes in the geographical location of the scientific output of individuals, as indexed in the Web of Science. The impact of these migrations on the co-publication networks of these institutions will then be highlighted using SNAs. The interest of these analyses for bibliometric studies is twofold. First, by following the progression of social network indicators for individual actors in their new network, it is possible to highlight integration (or its absence) in their new research environment. Second, the impact of their integration on the cohesion of the research community within an institution can be assessed by looking at network indicators related to the global structure of the network (e.g., network density, modularity). These analyses can be highly valuable for decision-makers when it comes time to evaluate whether the expectations regarding the integration

of newly hired researchers were met or not. We propose to demonstrate how SNAs such as those to be presented can be integrated into bibliometric studies to enrich findings in regard to scientific collaboration.

Deliberative methods, social and sociosemantic networks and opinion

François P. Robert (UQAM), Pierre Mongeau (UQAM), Johanne Saint-Charles (UQAM)

The study reported in this paper aimed at characterizing two types of deliberative methods, a more traditional deliberative assembly type using Rules of Order and a more “alternative” deliberative type using small group exchange techniques with regards to shared (or unshared) opinion, social networks and sociosemantic networks (based on discourse similarities). A deliberative mini-public experiment was conducted with 95 participants and various social networks, opinion and discourse similarity measures before, during and after the experimentation were gathered. Following the deliberative process, results show a change of opinion for participants, a polarization in the opinion as well as a significant augmentation of density within same-opinion groups. At that time as well, social and sociosemantic centralities are correlated. The direction of the correlation between social and sociosemantic networks during the experiment was reversed: a positive correlation was found for the traditional deliberative assembly and a negative one for the “alternative” deliberative type. Hence it is possible that the traditional deliberative assembly favours convergence around the discourse of the most central individuals while the alternative method favours the emergence of different discourse.

Filtering methods in the archaeological context

John Roberts (University of Wisconsin-Milwaukee), Matthew Peeples (Arizona State University), Barbara Mills (University of Arizona), Ronald Breiger (University of Arizona)

Research on archaeological networks often involves analysis of site-by-site networks based on continuous measures of the similarity between sites' artifact assemblages. While the weighted (and possibly complete) ties in such networks make it difficult to produce satisfactory network diagrams, such displays may be a primary attraction of network research for archaeologists who are not steeped in network analytic methods. Therefore it is important to consider how to best display such data. A variety of “filtering” methods have been developed to address similar situations in other substantive areas. After noting how archaeologists have tackled this problem to date, we consider the applicability and effectiveness of some of these filtering methods in the archaeological context. We use ceramic similarity data from Southwest Social Networks project of Mills and colleagues to investigate these methods.

Making sense of big data: Mobile phone communication predicts face-to-face interaction

Sam G. B. Roberts (University of Chester), Tobias Bornakke Jørgensen (Copenhagen University), Talayeh Al-davood (Aalto University), Jari Saramäki (Aalto University)

‘Big data’ from electronic communication (mobile phones, communication over the internet) allows for the examination of human behaviour on a scale, and at a level of detail, not possible with traditional methods of data collection such as questionnaires. However, much big data only contains information about communication over a single channel (e.g. email, Twitter, phone calls) and has little or no information about the social relationships behind the communication. Thus a key challenge for the field is interpreting how digital records of communication relate to the nature of social relationships people maintain with others. Further, face-to-face social interaction is important in building and maintaining social relationships, but this is the one type of interaction that rarely leaves a digital trace. In this study, we use a unique dataset from the Social Fabric study, which used smartphones to collect data over multiple channels from 800 students at a Danish University over the course of a year. Specifically, this study examines the relationship between the social network based on mobile phone calls and the social network based on face-to-face communication, as measured through Bluetooth connections between the mobile phones. In a novel use of Bluetooth data, the strength of the Bluetooth signal between the two phones was used to measure the distance between the two individuals during the face-to-face interaction. Overall, there was a significant relationship between mobile phone calls and face-to-face interaction. Importantly, there were several factors which affected the strength of this relationship, including the distance between the two network members during the face-to-face interaction. This was a stronger predictor of the number of phone calls than the total number of face-to-face meetings. However, there were also a number of relationships where there was frequent face-to-face interaction, but no mobile phone calls.

These results provide important information on how to analyse social networks based on Bluetooth data, in terms of detecting meaningful social relationships. Overall, this study suggests that big data from mobile communication does relate to patterns of face-to-face interaction, but there are several important variables which affect this relationship and which need to be taken into account when interpreting social networks based solely on mobile phone data.

Organisational cultural barriers to innovation: A social network perspective of the commercialisation of public research

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What impact do organisational cultural barriers between public research organisations and private firms, and further between business and technical professions, have on the likelihood of success in the commercialisation of innovation? This study investigates the social processes that lead to innovation success or failure of public-private research, with a view to identifying activities that will increase the ability to commercialise inventions from public research. Many barriers tend to hinder the process of commercialisation and this study will specifically address the organisational intercultural barriers that affect this process, using the framework outlined by Ankrah and Al-Tabbaa's review (2015) of the literature on University-Industry collaboration.

A number of propositions are put forward regarding the circumstances under which barriers between public research organisations and private firms and business and technical professions are crossed.

An explanatory mixed-methods approach is used, specifically, the analysis uses Exponential Random Graph Models (ERGM) which are statistical models for network structure, permitting inferences about how network ties are patterned. This is then followed up with qualitative data collection to offer further depth and a different perspective of the results. Results demonstrate that organisational and professional homophily, occupational and affective commitment, as well as social identity, all play a role. The implications of these findings for innovation outcomes will be discussed.

Global connectedness of local LNGOs: a remedy or poison for the young civil society?

Adil Rodionov (Eurasian National University), Darkhan Medeuov (Eurasian National University)

Can local non-governmental organizations (LNGOs) from developing countries be both locally rooted and globally connected? In the discussion about civil society, this question becomes increasingly popular. While some scholars argue that globally integrated organizations strongly prefer to build up partnership only with similar ones, others, conversely, point at positive association between global connectedness and local embeddedness. Rivals not only suggested different answers, but also used different methodologies. Major critique of globalizing LNGOs was made on the basis of case-study and qualitative techniques, but their rivals relied on quantitative analysis.

We suppose that it is possible to compare arguments of rivals if we use complex and simultaneously formalized explanation. We attempted to address these controversies within the framework of ERGM. The partnership network was derived from the survey of 133 Kazakhstani NGOs augmented by information from official sites. Insights of competitive scholars (advocates and critics of globally connected LNGOs) had been reformulated into the ERGM hypotheses, and, then, examined under the various dependence assumptions.

We found that the partnership structure appears to arise from financial and regional homophily, popularity spread and transitive closure, which partly supports the arguments suggested by critics of global integration. We, hence, argue that though aid of international donors fosters the growth of trust, there is lack of evidence that the culture of trust and collaboration spreads on a civil society at a whole. Rather it seems localized in the homophilic groups - such as globally integrated NGOs - with relatively high level of collaboration.

Who is Adding Value to Your Personal and Professional Networks?

Jonathan Roginski (Naval Postgraduate School)

We are each a member of a giant, multi-layered, complex social network. We have familial, personal, and professional ties that number in the hundreds and thousands-too many to keep track of! This research provides insight into how we may understand this enormity and complexity. Foundational is the well-known Pareto (or 80/20) Principle: 80% of your utility comes from 20% of your actions. In this context, we seek to highlight the surprisingly small number of your personal and professional connections upon which you may focus to realize the most utility from your networks. We show counter-intuitively that these “important” connections are not necessarily associated with high degree hubs, or other commonly used centrality measures. We use the newly-introduced distance centrality in identifying these important connections, comparing and contrasting its efficacy with other centrality measures currently in use (betweenness, closeness, eigenvector, and degree centrality). The author uses his own (in addition to other volunteers) personal networks to explain and verify findings.

Towards an Understanding of Citywide Urban Environmental Governance: An Examination of Stewardship Networks in Baltimore and Seattle

Michele Romolini (University of Vermont), Morgan Grove (US Forest Service), Curtis Ventriss (University of Vermont), Christopher Koliba (University of Vermont), Daniel Krymkowski (University of Vermont)

Efforts to create more sustainable cities are evident in the proliferation of sustainability policies in cities worldwide. It has become widely proposed that the success of these urban sustainability initiatives will require city agencies to partner with, and even cede authority to, organizations from other sectors and levels of government. Yet the resulting collaborative networks are often poorly understood, and the study of large whole networks has been a challenge for researchers. We argue that a better understanding of citywide environmental governance networks can inform evaluations of their effectiveness, thus contributing to improved environmental management. Through two citywide surveys in Baltimore and Seattle, we collected data on the attributes of environmental stewardship organizations and their network relationships. We applied missing data treatment approaches and conducted social network and comparative analyses to examine a) the organizational composition of the network, and b) how information and knowledge are shared throughout the network. Findings revealed similarities in the number of actors and their distribution across sectors; but considerable variation in the types and locations of environmental stewardship activities, and in the number and distribution of network ties in the networks of each city. We explore the possibility that differences in urban stewardship network structure may be a result of the variation in economic resources among cities. We discuss these and other potential implications of network research for urban sustainability governance.

Socio-semantic configuration of a Twitter territory

Camille Roth (CNRS), Iina Hellsten (VU University Amsterdam)

Our paper focuses on the socio-semantic configuration of a digital Twitter territory, in particular around the publication of the Inter-governmental Panel on Climate Change (IPCC) panel Working Group 2 and 3 reports in March-April 2014. We show that this portion of the public space is characterized by specific sets of structural positions which, in turn, correspond to specific semantic positions, in terms of discourses and alignments in the underlying debate on climate change.

We distinguish an “IPCC heart”, actively discussing IPCC, from an “IPCC shadow”, which more anecdotally mentions IPCC and is likely to correspond to the remainder of a public space minimally interested in IPCC-related reports. More precisely, from the 35k distinct authors of about 90k English-speaking tweets mentioning “IPCC” during this period, we manually identified the top 2% having more than 15 tweets in the corpus. This yields a “heart” made of 629 authors who produced about 27% of the total amount of tweets (retweets were excluded to focus on utterances and links originally made by individuals rather than duplicated from others). We manually identify these heart users, according to their type and, most importantly, alignment in the climate change debate. We assume that users may have a specific alignment, depending on whether they are generally critical or supportive of anthropic climate change, or unaligned. User types simply correspond to the kind of entity behind the account, sorted into seven categories: corporate, research, governmental, individual, media, NGO-related accounts, or “other” (for uncategorized accounts, such as those whose category could not be identified from their Twitter account).

The goal of our analysis is to assess which positions are being occupied within this specialized digital public space, and by whom. We note the existence of four typical positions: stars (both heavily cited and active), famous users

(cited without being very active), curious users (being rather active without receiving much attention), and silent users. In turn, these meta-positions are occupied by users whose type, alignment, and discourse very significantly diverges from a random baseline. Interesting observations relate to the position of critical users who, albeit in numeric minority with respect to supportive and unaligned users, are both most visible and cited in this climate change-related arena on Twitter. Other such star accounts feature under-represented and unaligned media and governmental agency accounts. Casual users, on the other hand, essentially remain supportive yet silent, while relying on concepts - discussing mitigation, cost, adaptation issues - which are in phase with those evoked by more institutional accounts and in stark contrast with those of the critical stars, who focus on scientific concepts ("hockey stick", "AGW", "data", "models" and "predictions", even referring to "scientists" and "science" per se). In a nutshell, our socio-semantic analysis sheds light on the intertwining of cognitive and structural position of a tightly delimited territory of the online/Twitter public space.

Repertoire Communities in American Popular Music 1895-1950

William Roy (UCLA)

One of the most commonly cited criticisms of popular culture is that it homogenizes society. Critics on both the left and right how the diversity of traditional life has been pulverized into the bland pabulum of popular culture. Conversely, scholars have probed the diversity of popular culture, examining how popular culture is structured along social lines aligning or bridging the cleavages such as class, race, gender, or age. The social boundaries that interest social scientists are most commonly differences among audiences, focusing on how aesthetic differences map to different groups of cultural consumers. But the social topology of culture is equally important among producers. Genres denote not only the sonic qualities that orient audiences toward cultural objects but also performance conventions and repertoires for performers. When a performer decides to perform a piece of music that has been performed by others, she is creating a relationship with the other performer. Clusters of musicians often cover each other's music, forming communities of common repertoires that may or may not be sanctified or widely understood to constitute a canon. Just how such repertoire communities have evolved and how they relate to other social qualities is the subject of this research project. This paper is a preliminary survey of repertoire communities in American popular music up until the beginning of the long play era. Repertoire communities are groups of musicians who record the same songs. Thus the analysis of who recorded common songs can give us a portrait of the social and musical terrain of popular music. Repertoire communities are groups of performers who tended to perform songs in common. How they grew, what distinguished them from each other, what kinds of musicians tended to cluster together and which groups were most central is thus an important aspect of the social dynamics of the American popular scene. This paper identifies repertoire communities decade by decade from a bipartite network of performers and songs in the first half of the twentieth century, using a percolation method of detection (CFINDER). It compares the efficacy of theories based on race and gender homology, production of culture, and the structure of genres to explain the configuration of these repertoire communities.

The re-birth of sociology in China in the early 1980s—a network analysis

Danching Ruan (Hong Kong Baptist University)

Sociological teaching and research was stopped in China in 1952. It was brought back in late 1970s, when the country started its economic reform. This paper analyzes the roles of actors from five groups in the early period of the re-establishment of sociology in China, i.e., from the late 1970s to mid-1980s. The leading actor of the first group is Professor Fei Xiaotong, the most prominent Chinese sociologist. He and other scholars who were sociologists before 1952 played a vital role in bringing sociology back. The second group of people were mostly junior scholars, who began to learn about sociology at this point. Government officials and university administrators are one group by themselves. Without their support, Fei and his colleagues could not have achieved anything. The fourth group was the young students who entered the university after the Cultural Revolution ended in 1976, and who were trained to be the main force in re-establishing the discipline of sociology in China. The fifth group consists of scholars from outside China, pre-dominantly American and Chinese American scholars based in the United States, and scholars based in Hong Kong. All five groups are indispensable in bringing back sociology to China. The interaction among these five groups has greatly influenced the direction of sociological development in China in the past three decades. The personal relationship among them has played a very important role in this process, and it is the focus of the current

paper. The paper draws from writings on and by the major actors in this social process, personal communications with some of them, archival data, and the personal observations and experience of the author.

Peer influence on injection status: social proximity vs. geographic proximity

Abby Rudolph (Boston University School of Public Health), April Young (University of Kentucky), Jennifer Havens (University of Kentucky)

Background: The HIV/HCV “risk environment” has been characterized as a dynamic interplay between structural and network factors, with individual-level drug use practices influenced by both the physical and social environment. However, most research on HIV/HCV risk behaviors among people who use drugs (PWUD) has examined the “risk environment” from only one of these perspectives.

Methods: Data were collected from 503 rural PWUD enrolled in a cohort study in the US. Participants reported recent (past 6 months) sex, drug, and social support ties ($n=897$). To determine whether clustering by injection status (for individuals separated by 1-6 degrees) could be explained by chance, we compared the observed network with a null distribution (1,000 randomly generated networks with the same network topology and overall injection prevalence, but with injection status randomly distributed). If injection status clusters more than what would be expected by chance, the probability that an ego injects given that his/her alter injects would be higher in the observed network than in the null distribution and would not be included within the 95% confidence interval for the null distribution. We also geocoded participants' residential addresses and calculated the distance between each pair of nodes using the Network Analyst extension in ArcMap 10.1. Based on the network simulations and distribution of distances, we generated variables to represent “social proximity” and “geographic proximity”. To determine whether social and geographic proximity of peers influences the association between peer injection status and individual-level injection status, we calculated network summary measures to represent the number of injecting and non-injecting alters who were 1) socially proximal, 2) geographically proximal, and 3) socially and geographically proximal, and regressed each on injection status.

Results: The mean shortest path was 6.6 (range:0-16) and the mean geographic distance between unconnected and connected nodes was 12.7 and 8.9 miles, respectively. The mean geographic distance between individuals increased with social distance; those directly connected were 6 miles apart on average vs. 14 miles for those separated by 16 degrees. Findings from network simulations suggest that alter injection behavior was more strongly correlated with ego injection behavior than what would be expected by chance for ego-alter pairs separated by ≤ 2 degrees ($P<0.05$). Based on the above results, we created variables for geographic proximity (≤ 7 miles) and social proximity (shortest path ≤ 2). The odds of injection was significantly higher for those with socially proximal injecting peers ($OR=3.12$; $p=0.02$) and increased as the number of socially proximal injecting peers increased ($OR=1.11$; $p<0.05$). The odds of injection was not significantly associated with having geographically proximal injecting peers ($OR=1.26$; $p=0.75$); however, the odds of injection increased with the number of injecting peers who were both geographically and socially proximal ($OR=1.09$; $p<0.05$).

Conclusion: In this sample, one's injection status was strongly influenced by social proximity to peers who inject and this influence extended beyond direct ties; the odds increased with each additional injecting peer within two degrees of separation. Geographic proximity to others who injected was only associated with injection when those peers were also socially proximal.

Social Network Analysis: Evaluating a Community Health Mobilization Strategy using a Women's Microfinance Platform in Uttar Pradesh, India

Jenny Ruducha (Boston University Center for Global Health and Development), James Potter (Boston University Center for Global Health and Development), Robin Lemaire (Virginia Tech)

We present results from a Social Network Analysis evaluating the Uttar Pradesh Community Mobilization Project (UP CMP), an intervention aiming to reduce maternal and newborn mortality in rural Uttar Pradesh, India by engaging a large network of federated Women's Self Help Groups (SHGs) to disseminate key health messages and the strengthen linkages between the community and the health system. These two project goals were studied through two types of networks: 1) the egocentric networks of recently delivered women (RDWs), the target population for the health message interventions, and 2) the sociometric networks of health-related stakeholders at the village and Block

levels. Both sets of networks were collected in 2013, before UP CMP's implementation, and then again in 2015, after two years of project implementation. The endline also included a qualitative interview component with some respondents in order to gain additional insight into the network data. The RDW networks (Baseline N=92, Endline N=180) describe the information and advice sources of RDWs from villages participating in the UP CMP, including family members, front line village health workers, SHG members, informal providers as well as facility providers at the Block and District levels. The health-related stakeholder networks (Baseline N=316, Endline N=700) describe the information exchange, coordination and health supplies-related networks of different stakeholders within and across village, Block, and District levels. Respondents included formal and informal health providers, community and religious leaders, SHG members and program staff, and front-line health workers. Results from the ongoing analysis will demonstrate to what extent the UP CMP has improved health advice networks of recently delivered women and strengthened the linkages between the community and the health sector.

Examining Bullying with a Longitudinal Social Network Analysis

Lisa De La Rue (University of San Francisco), Dorothy Espelage (University of Illinois Urbana Champaign), Kayla de La Haye (University of Southern California), Hank Green (RAND Corporation), Marc Punkay (RAND Corporation)

This study builds on research that has been conducted around predictive factors of bullying by applying social network methodology to principles of adolescent development. Peers are an integral aspect of adolescent development and therefore the influence of peer relationships serves as an important area of exploration when considering youth behaviors. Although studies have documented the influence of peers on bullying, these studies are often limited in that they rely on individual-level self-reports and do not take into account the socialization process of peers. To address this gap, this study utilized a SIENA analysis, a technique that enables researchers to examine the socializing effect of peer affiliation by disentangling peer selection and influence.

Participants included 401 students from a high school in Illinois who were surveyed across three time points. The sample includes youth who predominantly identify as African American (32.4%) or White (38.7%). The aims of this study were to identify factors that correlate with self-reported bullying behaviors, including family, community, and school level factors, and to investigate whether and how peer group socialization of bullying can be captured and understood through SNA. Specifically, the study utilized SIENA analysis to explore the social network of the students in order to distinguish the effects of friendship selection and influence on bullying behaviors.

The findings of this study will provide additional insight into the etiology of bullying perpetration and suggest pathways by which prevention programs might be optimized. For example, if significant selection effects are found, then it can be expected when youth desist from engaging in bullying behaviors they will affiliate with different peers, and perhaps, with those peers engaging in lower levels of bullying perpetration. As such, interventions that address risk factors including feelings of anger and hostility, and interventions that increase protective factors like school engagement, may help youth manage their concerns and support young people in changing their behaviors and subsequently shifting their peer networks to include friends who are engaged in lower levels of bullying perpetration. The results of this study also have the potential to provide additional insight regarding incorporating bystander interventions into prevention programming efforts. The presenters will plan to present results from ongoing analysis.

How do Social Networks Change? A Conceptual Framework.

Guillermo Ruiz (The University of Los Andes), Eric Quintane (The University of Los Andes)

Understanding how social networks change has captivated researchers in management for several decades. In fact, the breadth of empirical studies on antecedents and consequences of network change has been such that it has outgrown existing conceptual frameworks, and we are missing a comprehensive understanding of network change itself. Based on an in depth review of the literature on network change in organizations, we propose a conceptual framework to classify different types of network change and to categorize analytical strategies to measure network change. Building on the extant literature, we consider that all network change is essentially a change in nodes or in ties. However, not all changes in nodes or ties are equal and we propose that these changes can be classified along two dimensions: focus and scope. With focus we differentiate changes in nodes or ties that are related to a change in an actor's position from those that are related to a change in a relationship. With scope, we distinguish between changes that occur within the local network neighborhood of the actor (or of the relationship) and changes that occur at a global level. Additionally, we propose that network change can be analyzed using three different strategies: variations, trajectories

or archeological traces. We discuss the value of this conceptual framework by showing that it encompasses existing literature while highlighting potential avenues for future research.

Community Peer Support for Autism in Social Media

Amit Saha (University Of Arkansas Medical Science), Nitin Agarwal (University of Arkansas at Little Rock)

With increasing prevalence of autism spectrum disorder (ASD) among the younger generation ages 3 through 17, there is a shortage of adequate resources to deliver care for the individuals dealing with autism. Families dealing with autism face enormous economic costs and emotional stress to provide care for personnel diagnosed with ASD. Globally, almost two billion people use social media regularly to connect and stay in touch with their friends, family, and acquaintances irrespective of distance. For the families dealing with autism, social media provides an open and easily accessible platform to share, gather and exchange information. Systematic analysis of this extensive interaction among autism community members on social media can be used to build a learning tool for others who are dealing with autism. Social sciences literature offer theoretical definitions for social support and stress. Leveraging these theoretical definitions, and employing concepts from linguistics and social network theory, in this work, we propose information-theoretic models to assess social support and stress. The proposed methodology not only enables us to estimate social support and stress in a health community but also evaluate the effectiveness of health communities vis-a-vis support provided by the community to its members. Using network-based measures such as centrality, hub, and authority along with linguistic measures such as positive attitude, social process, spiritual, assent, and personal relevance social support in an interaction can be gauged. Social network analysis along with linguistic measures of personal concern, anxiety and anger can help us measure stress experienced among the community members. The research design used in the study is also generic and applies to other online healthcare communities as well as general online or virtual communities, such as gaming, education, and learning. In the study, we systematically analyze the interactions among families of autism communities on different social media platforms to extract knowledge and to assess the support and stress propagated via those interactions within the autism community. We retrieved the most recent permissible tweets and blogs content of 300 autism community members recommended by AutismSpeaks.org, Babble.com, and Socialbearing.com for analysis of community support for autism in the different social medium platform. For the baseline evaluation, data from online health communities' viz. alcohol support forum and autism support forum was analyzed to deduce the amount of social support and stress provided in a forum interaction. We found that the autism community provides significant social support to its members both in Twitter and blogs. It was also found that autism community members add minimal stress to the community. Social support facilitated by interactions with fellow autism community members helps in reducing the stress thereby improving the quality of life of the families dealing with ASD.

Teams and Ties: Workflow, Organisational Cultures and the Role of Workplace Design

Kerstin Sailer (University College London, Bartlett School of Architecture)

Who members of an organisation interact with has been studied widely in the network community and has led to the formulation and articulation of important network theories such as social capital theory and the related ideas of closure and brokerage. Rather than analysing the role of embeddedness of individual actors, this paper considers teams inside organisations as the relevant unit of analysis. Two main levels of network embeddedness are of particular relevance here: the entanglement of teams in an organisational context; and the role of space in creating an additional layer of team relationships centred on proximity and visibility. Previous research has highlighted that being on the same floor of an office building creates an important rationale for interaction. Hence four types of ties are considered in this research: 1) face-to-face interaction between individuals in the same team and on the same floor of an office building (organisational and spatial closeness); 2) same team, but different floor (organisational closeness); 3) different team, but same floor (spatial closeness); 4) different team and different floor (random encounter). Dependent variables possibly explaining face-to-face interaction within and between teams will include: size and complexity of an organisation; the everyday workflows (i.e. is there an organisational task driven necessity to interact with other teams, and if so, how important is it); the cultures of a place (i.e. is the organisation conservative and inward looking, or does it depend on and reward cross-team idea sharing and fertilisation); visibility and openness of the workplace overall (i.e. opportunities to interact widely with others); and last but not least, physical location of a team (i.e. in a centrally integrated location of the workplace or rather in the last corner of the top floor far away from everyone else). This paper will explore these questions using a data set of intra-organisational face-to-face interaction networks in 460

different teams across 20 different knowledge-intensive workplaces, mostly from the private sector including industries as diverse as media, advertising, retail, design, finance, law and technology. Data was collected during a 7 year period from 2007-2014, where each organisation was studied separately with the same methodology of investigating social networks of interaction through self-reported surveys. Additional data includes the floor plans of the organisations (studied with the spatial network analysis method known as 'Space Syntax') as well as information on workflows and cultures from semi-structured stakeholder interviews. With a focus on team interaction, embeddedness, physical location and organisational cultures, the paper will provide first insights into the various factors that drive face-to-face interaction in knowledge-intensive businesses.

Affection, cognition and power in social and sociosemantic networks

Johanne Saint-Charles (Universt   du Qu  bec    Montr  al), Pierre Mongeau (UQAM)

The issues addressed in this paper have emerged from some of our previous studies exploring the links between cognitive, affective and influence social networks as well as the relationships between social networks and people's discourse. For example, we have shown that, in organisations, the type of uncertainty present in a situation prompted people to call upon either "cognitive" or "affective" relationships. In small groups, our results led us to conclude that affective network centrality was more strongly related to influence network centrality than cognitive network centrality was.

With regards to discourse we have shown that centrality in the sociosemantic network (based on the similarities of group member's discourse) was correlated to the influence network centrality but with the presence of thresholds around which the relationship between similarity and influence reverses. Finally, another study revealed that people tend to use either affective or cognitive words to describe the various relationships in their lives.

All of these results led us to wonder in which ways affective and cognitive social networks (e.g. support and advice networks) are linked to sociosemantic networks? Are the affective and cognitive dimensions reflected in the discourse itself? If so, is the use of more affective words a criterion to be central in the influence network? Those are some of the questions for which we hope to propose some answers.

Tweet2Quit: Communication networks and smoking abstinence in a group-based intervention

Ashley Sanders-Jackson (Michigan State University), Jingbo Meng (Michigan State University), Connie Pechmann (UC Irvine), Judith Prochaska (Stanford University)

Previous research has found that being part of a community of smokers can affect an individual's smoking behavior. Further, recent research by our team has found that being part of a virtual social network quit smoking group may improve abstinence. Little is known about the process by which this occurs. Also of interest in the tobacco treatment field is the finding that women tend to have a harder time quitting smoking than men; the reason for the difference is unclear. The present study aimed to use social network analysis to (1) examine the relationships of communication in online smoking cessation groups and smoking abstinence outcomes, and (2) investigate the role of gender in moderating the effectiveness of communication in online smoking cessation groups. Data were analyzed from the intervention arm in an NIH-funded randomized controlled trial for smoking cessation called "Tweet2Quit". Daily smokers were recruited and randomized to a control group or to a 20-person private group on Twitter. The Tweet2Quit intervention provided automated messages on a daily basis that encouraged interaction in the group. Here, we report on communications in the six Tweet2Quit groups (N=120 participants). The tweet data for a 60-day period were downloaded from Twitter and organized by tweets: showing the sender of the tweet, the designated recipient(s) if specified by the sender, the date and time the tweet was sent, and the content. Communication networks were created using the tweets with specified designated recipient(s) for each Twitter group. In addition, tobacco abstinence was assessed individually by survey at 7-, 30-, and 60-days post quit-date. For each of the six Twitter groups, the edge list of tweet senders and recipients was imported to NodeXL for analysis and visualization. We focused on individual positions in the communication network, including centrality (i.e., indegree centrality, outdegree centrality, betweenness centrality), local clustering coefficient and ratio of reciprocated ties for each participant. Combining participants from the six Twitter smoking cessation groups (N = 120), we analyzed the relationships between individual positions in the communication networks over a 60-day period and smoking abstinence outcomes at 60-days post quit-date using logistic regression. The results showed that participants with greater outdegree centrality were more

likely to be abstinent ($b = 2.12$, $\exp(b) = 8.34$, $p = .05$); whereas participants with greater indegree centrality were more likely to be non-abstinent ($b = -1.91$, $\exp(b) = .15$, $p = .05$). The betweenness centrality and local clustering coefficient were not significant predictors of smoking abstinence. Further, the interaction between indegree and gender had a positive effect on smoking abstinence ($b = .99$, $\exp(b) = 2.71$, $p = .05$); whereas the interaction between outdegree and gender had a marginally significant negative effect on smoking abstinence ($b = -.95$, $\exp(b) = .38$, $p = .08$).

Transition to motherhood in hardship situation in Romania: Disorganized family networks as a cumulative disadvantage

Marlène Sapin (FORS & LIVES, University of Lausanne)

Family relationships accounts for much of the support for women facing social and economic hardships across the transition to motherhood in Romania. One may assume that their family networks represent a cumulative disadvantage for mothers' poor mental health, as well as for child neglect or abandonment. We consider the complex interdependencies of support within their family network, and apply various measures stemming from the social capital perspective. Based on a longitudinal assessment of 20 mothers in hardships, compared with a paired sample of middle class mothers, this paper reveals that the family configurations of mothers facing a risk of child abandonment lack of basic structural organization, in terms of reciprocity and transitivity. It also shows that these micro-level processes have incidence on the larger structure of their family configuration and, therefore, on the resources provided to these women. This lack of basic structural organization of supportive ties within their family network is found associated with higher level of distress for the mothers in hardship, at the demanding time of the transition. The disorganization of family networks is part of a multidimensional cumulative process of disadvantages, which is correlated with the mental health of the mothers, with consequences on their parental skills, and the quality of the relationship with their children.

Investigation of operational strategies and organisational structures of multinational private water companies

Yasaman Sarabi (University of Greenwich)

The different aspects of private companies' participation in providing water and sanitary services have been extensively discussed in the literature. Issues that are usually raised by scholars as well as policy makers discuss the importance of these services for customers' well-being and health and argue whether private companies' involvement could result in water being treated as a commodity while it should be made available to everyone since water is essential for life. From an inter-organisational viewpoint, each private water company consists of a considerable network of subsidiaries scattered globally operating under the parent company's supervision and providing different services which can range from building infrastructure for the provision of water to billing and payment. Two French multi-national companies, Veolia Environnement and Suez Environnement, which provide environmental services including water and sanitary services, are the focus of this study. A large dataset has been compiled for the purpose of this work using detailed information available on the structure and operation of these two companies from ORBIS database. With the help of network analysis tools, block-modelling in particular, the geographical distribution of the different services and provided by these two companies, and the operation clusters have been identified. The aim of this analysis is to shed light on the global operation structure of these two companies and investigate how their organisational structure and their parent-subsidiary networks have affected their operational strategy decisions. By comparing the results for the two companies, potential collaboration or competition trends can also be identified and the globalisation and regionalisation strategies of these companies can be better understood.

Counteracting the "Bad Apple": Disrupting Dark Organizational Networks to Enhance Performance and Commitment through the Strategic Use of Market Information

Cinthia Saturnino (D'Amore-McKim School of Business, Northeastern University), Mark Houston (Mays Business School, Texas A&M University), Edward Bond (Foster College of Business, Bradley University)

Because firms must continuously innovate to remain relevant and competitive, understanding conditions that foster innovativeness is vital to a firm's survival. Creativity is a critical sub-process of innovation (Shalley and Gilson

2004). Although creativity can occur in isolation, it frequently results from an interactive process between individuals and the social structures in which they are embedded (Mumford and Gustafson 1988). Factors that positively influence creativity have been examined extensively in the literature. However, effects of negative social influence are less understood, despite the prevalence of negative social structures in organizations. According to a recent Gallup poll comprised of 230,000 employees in 142 different countries (Adams 2013), unhappy, disengaged employees outnumber happy employees two to one worldwide. Specifically, while only 13% of employees were actively engaged and considered passionate about their work, the vast majority reported “sleepwalking through their day,” and 24% were “actively disengaged” - they dislike their jobs intensely. Social network analysis provides an effective tool to assess social dynamics and how dark social structures impact the innovativeness-performance relationship. Traditionally, networks are defined as “dark” when they are covert and illegal, such as terrorist cells and crime cartels, though benign organizations can be considered dark as well, as the case with collusive B2B networks (Everton 2012; Pressey, Vanharanta, and Gilchrist 2014). However, little is known about the impact of dark networks within organizations. This work reimagines the concept of dark networks as networks within organizations that, while not illegal, are potentially damaging to an organization’s innovation performance. Ego networks are considered dark when the ego’s alters have negative attitudes and perceptions toward the firm. In the study, the interaction between an ego’s innovativeness, the combined darkness (negative attitudes and perceptions) of their alters, and the performance of the ego is the core relationship of interest. The darkness of the ego network is expected to dampen the positive innovativeness-performance relationship for the ego. However, leader attitudes and management style are expected to enhance the positive innovativeness-performance relationship for the ego - providing avenue to counteract the “bad apple effect.” Finally, the use of market information is expected to condition the effects of the moderators by enhancing the positive effect of positive leaders while inhibiting the negative effect of dark ego networks. In uncovering the effects of dark networks on innovative performance, the work provides several insights. First, examining ego network darkness provides a new avenue of exploration for organizational scholars, and suggests a way to account for contextual factors that influence innovative performance. Second, the work provides solutions to disrupt these dark networks and optimize the innovativeness-performance relationship in the form of leader-based interventions and proactive use of market information. The role of market information is particularly relevant for marketing researchers, who are responsible for gathering market information and disseminating it to functional managers. Uncovering the role of marketing information in disrupting dark networks, therefore, provides a link between the internal dynamics of the firm and the external context in which the firm is embedded.

Getting in Position: Uncovering the Antecedents of Global Network Position

Cynthia Saturnino (D’Amore-McKim School of Business, Northeastern University), Willy Bolander (Florida State University), Christopher Plouffe (University of Akron), Rebeca Perren (California State University, San Marcos)

Advantageous network positions provide a certain form of capital that can be converted into benefits such as access to unique information, information control, influence, and social status (e.g. Bolander, Saturnino, Ferris, and Hughes 2015; Borgatti and Foster 2003; Burt 2000; Mehra, Kilduff, and Brass 2001). While a significant amount of scholarly activity has focused on the benefits and results of occupying these advantageous positions, little is understood about what factors drive the acquisition of these positions. Moreover, a comprehensive framework for uncovering and classifying antecedents has remained elusive. We propose a framework guided by the triadic theory of influence (TTI; Flay, Snyder, and Petraitis 2009) to guide the selection and specification of proposed antecedents to global network position. TTI is a meta-theory originated in the health behavior literature with the goal of integrating conceptually relevant theories and variables in a meaningful way. The framework for explaining behavior incorporates the more commonly known theories of reasoned action and planned behavior, as well as theories of decision making, problem solving, and social cognitive theory. Moreover, the comprehensive theory provides a practical and testable way to specify various potential antecedents. TTI asserts that the streams of influence are the conduits by which ultimate and distal causes of behavior flow. These ultimate and distal causes ultimately impact proximal causes, which in turn impact the observed behavior. TTI also allows for the fact that many of the constructs in a stream mediate and/or moderate other constructs within the stream. We assert that intraorganizational navigation leads to the acquisition of an advantageous global network position. Intraorganizational navigation is a measure of proactive behavior by actors within an organization that result in improved “socially derived outcomes” (Plouffe and Gregoire 2011). Proximal behavioral controls, social normative beliefs and attitudes toward social behavior were operationalize as propensity to connect with others (e.g. Totterdell, Holman, and Hukin 2008), satisfaction with peers (e.g. Arvey, Bouchard, Segal, and Abraham 1989), and affective organizational commitment (e.g. Rhoades, Eisenberg, and Armeli 2001). These

proximal influences are expected to mediate the relationship between the distal influences and interorganizational navigation. Distal influences examined in the present work include political skill (individual influence stream; Ferris et al. 2005), team cohesion (Dixon, Gassenheimer, Barr 2002; social influence stream), and person-job fit (Edwards 1991; environmental influence stream). Ultimate or underlying causes include personality, interpersonal competition, and organizational identification. These underlying causes are usually the furthest removed from behavior; they are, by and large, out of the hands of an individual and are relatively stable within the environment, which in this case is the organization (Flay, Snyders, and Petraitis 2009). Data were collected from newly hired salespeople at a large, U.S. based direct-to-consumer sales organization. Preliminary results support the proposed hypotheses. The distal and ultimate cause level constructs positively and significantly impact the proximal influences, which, in turn, impact intraorganizational navigation. Intraorganizational navigation subsequently impacts global network position, a relationship conditioned by perceptions the social network.

An Investigation of Prison Inmate Network Structure

David Schaefer (arizona state university), Jacob Young (Arizona State University), Derek Kreager (Penn State University), Martin Bouchard (Simon Fraser University)

Nearly 3% of the U.S. population has spent time in prison, yet we know remarkably little about the social structures in which inmates spend their days. We use data on relations among approximately 200 male inmates in a medium security prison unit from the Prison Inmate Network Study (PINS). Inmates living on the unit provided survey data on relations of friendship and respect at two time-points, and networks of information and exchange at one time point. We use this data to begin to characterize the structure of inmate networks and test several hypotheses about what drives network structure. For instance, research and popular culture suggest that prison relations are heavily segregated by race and ethnicity (i.e., homophily). We find evidence consistent with this expectation, but also systematic deviations from this pattern. In investigating association patterns, we consider inmate power, criminal background, housing assignment, health, and sociodemographic attributes. We employ a range of methods to assess network structure and dynamics, including exponential random graph models (ERGMs), stochastic actor-based models (SABMs), blockmodels, community detection, and brokerage analysis.

Solving Temporal Team Assignment Problems using a Markov Decision Process Framework

Aaron Schecter (Northwestern University), Prithwish Basu (BBN Technologies), Noshir Contractor (Northwestern University)

Work groups and teams are functional units designed to collectively accomplish a set of tasks or problems using their combined expertise. The quality of interaction and collaboration within these sets of individuals often influences the performance of the team. As a result, there is a significant body of literature that studies the effective formation of teams, the assignment of teams to tasks, and the processes by which teams complete their tasks. However, it is often the case that a set of individuals must continue to work together for an extended period of time, and therefore face multiple sets of tasks as part of a greater mission. In this scenario, the team structure that effectively solves one set of tasks may not be the best structure to solve potential future tasks. Consequently, the most productive group over a time span is one that balances the needs of the present with the potential needs of the future. This combination of tasks, individuals, and a collaboration network over time forms a dynamic task collaboration network system. The goal of this study is to propose a mathematical framework that can determine an optimal strategy for forming and reconfiguring (or switching) teams with respect to a series of tasks. For the purely myopic case, the problems of team formation and team assignment can often be solved using network methods. Specifically, we assume that group members are represented as nodes, and there are weighted edges between the nodes representing the collaboration cost of those two individuals working together. Tasks may also be represented as nodes, with edges connecting these nodes to the nodes of the workers assigned to the problem. A temporary team is then formed when multiple individuals are assigned to the same task. The optimal assignment of individuals to tasks is typically accomplished by finding a cover in the bipartite worker-task network, while minimizing the collaboration cost that is incurred as a result of the teams created. The incorporation of time into this problem adds an additional layer of complexity. Reconfiguring the structure of a set of teams may cause some degree of process loss due to a variety of factors, even if the new configuration is optimal for the present set of tasks. Thus, an optimal team assignment over a period of time must consider the tasks at the present time, as well as the future tasks the group will potentially face. The arrival of these future tasks could be deterministic or probabilistic. To effectively solve this problem, we

propose a stochastic dynamic programming approach to determine the optimal policy of team formation and team switching. The decisions of whether to switch teams or not in a dynamic task collaboration network system can be modeled within the well-known Markov Decision Process (MDP) framework. For a well-defined set of potential states, actions, transition probabilities, and cost functions, this problem may be solved. We discuss the structure of this problem and potential applications, as well as possible challenges and limitations.

Modeling the Coevolution of Event Networks and States with Application to Team Process

Aaron Schecter (Northwestern University), Noshir Contractor (Northwestern University)

Increasingly, social network data include time-stamped events such as emails, text messages, and interactions with a website. Relational event models (REM) are statistical tools designed to predict how generative behavioral, cognitive, and social mechanisms contribute to future events in a network. The primary advantage of the relational event framework is that the exact sequence and timing of actions are directly observed. Because of this high temporal granularity, distinct patterns can be modeled, including exogenous effects, endogenous effects, node or relational covariates, and environmental effects. REM is being utilized to study team process. Process is a broad concept that encompasses all aspects of how a team works towards its collective goal. REM is particularly well suited to understanding the micro-level dynamics of teamwork. But theories of team processes suggest that these micro-level events influence, and are in turn influenced by, individuals' affective and relational states (which are not events).. Individuals' actions and interactions - which are both events occurring at a specific point in time for a specific duration - co-evolve with their individual attributes (such as expertise) and relations (such as trust with one another) which are both states that unlike events don't occur sporadically. It is therefore conceptually critical to model the dynamic co-evolution of events and states to understand the team processes. This notion of coevolution is well established in traditional stochastic actor-oriented models. These models consider a series of discrete time observations, with each observation consisting of a static network and a set of attributes. The change between these static states was then modeled as a (hidden) Markov process. The key limitation to this method is the lack of granularity; the micro-level changes that inherently must occur over time are impossible to know, and as a result simulation must be used to "guess" the intermediate dynamics. However, under the relational event paradigm the exact sequence of events that occurred from point A to point B is now visible, and can be used to inform our inference on the behavioral changes. However, as we argue above, a key limitation to contemporary versions of REM is its inability to incorporate the coevolution of state variables with these event variables. The key methodological advancement in our research is the integration of relational event data with the traditional stochastic actor-oriented network coevolution model. We maintain the structure and logic of the stochastic actor-oriented co-evolutionary model. We leverage the granularity of newly available relational event data, when available, leading to a higher degree of fidelity and greater freedom in defining sufficient statistics. However we retain the simulated network micro-steps utilized by the original actor-oriented model to estimate changes in states. We present a mathematical formulation of the integrated framework and discuss potential network statistics. We also illustrate the use of our model for the study of team processes.

Is it a Sign of Stability if Multiple Centrality Indices Agree?

David Schoch (University of Konstanz), Ulrik Brandes (University of Konstanz)

High correlation among multiple centrality indices are often presented as evidence for robustness of results, i.e. indices agree upon a definition of centrality.

We recently showed, however, that all centrality indices agree on a partial ranking that is more or less determined depending on the network structure. This finding offers new explanations for observed correlations and has further implications for empirical settings.

The more complete the partial ranking, the less explanatory power do specific indices have. In fact, all indices will induce similar rankings and thus yield competing explanations for empirically observed phenomena. The degree of completeness therefore serves as an indicator for robustness of results, independent from explicit ideas about centrality.

The less complete the partial ranking, on the other hand, offers a high degree of freedom to define deviating indices. We are not confronted with competing explanations but can rather argue about better or worse performance of indices as explanatory variable. Incompleteness thus serves as an indicator for specificity of centrality, hence the more interesting case for a centrality analysis.

Due to the evident importance of the predetermined partial ranking, we discuss its assessment by various means to determine explanatory powers of centrality prior to the application of indices. Additionally, we elaborate on robustness and specificity of results with illustrative examples.

Social networks and barriers to innovation in urban water infrastructure planning

Lisa Scholten (Delft University of Technology), Gunilla Öberg (University of British Columbia)

Climate change, urbanization, and increased demands on sustainability require rethinking our current urban water systems. Despite promising and innovative water solutions being available, the status quo usually prevails. Socio-institutional hindrances ("barriers") in the infrastructure planning process are increasingly put forward as a main reason for this innovation deficit. To overcome these barriers, more structured and dialogue-based multi-stakeholder planning processes are demanded. Such processes do, however, require identification not only of the barriers, their origin and why they remain but also identification of the participants that are needed to overcome those barriers. The aim of this study is to develop an analytic framework for identification of barriers and their connection to the decision-making process, stakeholders, and stakeholder networks. To investigate these relationships, we conduct a longitudinal social network analysis of actor collaboration throughout a planning process. The structural properties of the network are mapped to individual actor attributes such as their objectives and power resources. The power resources considered cover centrality in the collaboration network, position within the institutional hierarchy, expertise, and access to subject-matter information. The results allow identification of barriers and their potential root causes, which are essential to the design of functional multi-stakeholder planning processes and the identification of key stakeholders. We test the framework in three major water-related infrastructure projects at the University of British Columbia (UBC), Vancouver, Canada. The results will be used to improve the analytic framework for a comparative study of municipal urban water decision-making. In this conference paper, the analytic framework, research design, and preliminary results from the social network analysis at UBC will be presented.

Knowledge and informal network structure of teacher's project teams.

Bieke Schreurs (Open Universiteit Nederland), Maarten De Laat (Open University of The Netherlands)

Background. Knowledge management theory categorizes three types of knowledge as important in the workplace. Codified explicit knowledge is often documented and easy to transfer; tacit knowledge is embedded within the knowhow of people and is often hard to express; potential knowledge often lies outside the own organization. According to Smedlund (2008) each type of knowledge (explicit - tacit - potential) creates its own knowledge environment and each environment is characterized by a specific network structure. **Purpose.** In this paper we will investigate if the type of knowledge used by thematic project teams of teachers in a vocational school in the Netherlands correlates with the informal learning network structure. In this paper we hypothesize that (1) informal learning networks dealing with potential knowledge will have (a) a low number of reciprocated ties (b) relative low density and (c) low centralization. (2) Informal learning networks dealing with tacit knowledge will have (a) a high number of reciprocated ties (b) relative high density and (c) a more distributed network structure. (3) Informal learning networks dealing with explicit knowledge will have (a) a low number of reciprocated ties (b) relative low density and (c) high centralization. **Method.** Social network data were collected from 194 teachers in a secondary school in the Netherlands who participated in 13 specific thematic projects. To measure the type of knowledge identified in each thematic project we used a questionnaire based on the work of Zander and Kogut (1995). Network measures for the 13 project teams were calculated using UCINET. Secondly we performed a spearman correlation between the network measures and all the items used to measure the types of knowledge.

Results. In contrast with hypothesis 3.a we found a significant positive correlation between the level of reciprocity in the project team's learning network and the level that the knowledge was perceived as good documented (explicit) by the project team members. Although we did not investigate the direction of the correlation in more detail, possibly the availability of more documented knowledge is a result of learning in symmetric dyads. Research in the dynamics of the structure of the networks is needed to get more insights into this phenomenon. In general however in our sample we did not find a confirmation for the theoretical idea of specific structures for specific knowledge used in learning networks.

The Effect of Social Networks on Adults' Health: A Counterfactual Approach to the Indonesian Family Life Survey

Julia Schröders (Epidemiology and Global Health, Umeå University)

Humans are naturally social beings. A plethora of research suggests that social networks are crucial for health. Yet, current evidence indicates that the modern way of life is greatly reducing the quantity and quality of such support structures. Given this, understanding the nature and extent of the association between social networks and health is of increased importance especially in the light of rapid population aging and epidemiological transitions towards chronic non-communicable diseases (NCDs) and concomitant functional decline. In Indonesia NCDs are causing 71% of all deaths with cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes being the leading causes of death. Using data from the 4th wave of the Indonesian Family Life Survey (IFLS) collected during 2007/08, we employed the counterfactual framework developed by Rosenbaum & Rubin to examine the effect of social networks on the health of adults aged 40 and over, as measured by functional health (Activities of Daily Living/ADLs, Instrumental Activities of Daily Living/IADLs limitations), and NCD morbidity. A composite social network index was derived of five types of social connections: marital status, religious group membership, participation in community activities, trust in neighbors and the village, and sociability based on contact with close relatives. We followed as closely as possible the procedure described by Berkman & Syme. This index allowed categorizing individuals based on their levels of social connection ranging from socially isolated (low social network index) to socially integrated (high social network index). Propensity score matching (PSM) was used to explore the relationship between social networks and health outcomes. PSM is a multivariable scoring method ideal for isolating the effects of the exposure, social networks, above and beyond other factors since it allows estimation of the effect of having a strong social network on health in a non-exposed individual, if that individual would have had a strong social network. STATA's `teffects psmatch` was used to estimate treatment effects by propensity-score matching. We included 7,537 individuals (3,651 men and 3,886 women; mean age 53 years) into the analyses. In this sample, 10% suffered from one or more major NCD while 41% reported one or more ADL/IADL limitation. One-fifth of all adults scored a low social network index. Our analysis revealed that a strong social network index reduced the probability of having NCDs by 2 percentage points (Coef. $-.02109$; $p=0.024$). The propensity for exposure to social networks had no statistically significant effect on ADL/IADL limitations (Coef. $-.009$; $p=0.524$). Due to the debilitating nature of NCDs, people with such conditions have perhaps one of the highest needs for social networks and stand to benefit from such structures. Especially in a developing setting like Indonesia where often only limited social protection systems are available, and significant geographical and infrastructural barriers in accessing those that do exist, many sources of formal support are simply not at hand when needed. Our results showed that instead, informal social support networks from family, friends, or the wider community might be an additional source of assistance when it comes to maintaining health and wellbeing.

Euromaidan vs Twitter: Evolution of Social Movement Communication Networks

Robert Schroeder (Naval Postgraduate School), Sean Everton (Naval Postgraduate School), Daniel Leroy (Naval Postgraduate School)

In recent years, social media has become a common communication medium for social movements. These social movements are able to interact with members, sympathizers, and the general public using social media, and are embedded within the overall conversations on social media. All social media conversations, over time, ebb and flow in terms of the clustering. As various events happen, the network topography of the conversations change. Sometimes portions of the network become denser, other times portions of the network will become less dense and instead be highly centralized. During the Egyptian Revolution of 2011, those users that were talking about the revolution on Twitter and were activists within the revolution had a much higher occurrence of triadic closure and clustering than those accounts that surrounded news organizations or celebrity accounts. This has also been true when looking at conversations about the Islamic State on Twitter, with pockets or subgroups that had much higher density and clustering being where key Islamic State propaganda accounts were located, and other accounts that were just talking about news related information about the Islamic State being in subgroups that had much less clustering. While this is interesting, these networks were created by pulling only tweets that contained certain key words that were important to those specific social movements.

This research expands on the previous research, but looks at a sample of all tweets worldwide, regardless of what the conversations were about, in order to see if there is a difference around conversations on Twitter about social movements when compared to all other conversations on Twitter. In order to accomplish this, the research focuses in on the Euromaidan social movement that was very prominent during early 2014 and resulted in the toppling of the Ukrainian government. It analyzes data obtained from GNIP which includes 10% of all tweets worldwide from

around January and February 2014, a period when the Euromaidan social movement was extremely active. From this data, we create a network of all tweets worldwide for different time periods, run subgroup detection algorithms on those networks, and extract the subgroup that contains prominent Euromaidan related accounts. The subgroup that contains Euromaidan accounts is then compared to other subgroups in order to see if there are differences in the network topography that would make Euromaidan's, or other social movements', conversations uniquely different from general conversations on social media. These changes in network topography are then analyzed overtime in relation to the events that were happening in Ukraine and worldwide so that we can determine whether or not structural changes to conversations might be related to events being carried out by social movements. This research is important because if a relationship can be found between the structural properties of the conversations on Twitter, regardless on what the conversations are about, and the events being carried out by a social movement, we might in the future be able to better predict the emergence of social movements.

Empirical dimensions of social capital. Testing for inter-group measurement equivalence of the social capital instrument of the German National Educational Panel Study

Benjamin Schulz (WZB Berlin Social Science Center)

In order to better understand how ethnic networks and communities influence the socio-economic incorporation of immigrants, it is promising to consider the various forms of social capital that these groups provide to their members. This is much easier said than done. A main reason for this is the fact that many large-scale surveys lack multi-dimensional social capital measurements. In order to close this gap, we developed a multi-dimensional social capital instrument for the various cohorts of the National Educational Panel Study in Germany (NEPS). This ego-centered instrument consists of five modules: 1) A position generator; 2) a resource generator; 3) an adapted version of the Burt generator; 4) compositional measures of the respondent's group of friends; 5) perceived expectations of various reference groups depict the normative and motivational environment. In this paper, I give an overview on the NEPS social capital instrument and the general NEPS design. Against this background I address two consecutive questions. I, first of all, test whether or not a two-dimensional measurement model of social capital is more appropriate than a one-dimensional one. Using techniques of confirmatory factor analyses, I show that labor market related social resources and career orientations of peer groups form two distinct social capital dimensions, as hypothesized. Employing multi-group confirmatory factor analysis (MGCFA), I, furthermore, analyze measurement equivalence across the native and the immigrant population in Germany. In contrast to cross-country comparative research, testing for measurement equivalence is rather taken for granted than tested when groups are compared within countries. This practice is particularly problematic in integration research because inter-group measurement differences are more likely in this field than in most others. For one thing, intercultural differences in norms are likely to cause inter-group differences in the propensity to disclose certain attitudes or behaviors. For another thing, respondents of different ethnic or cultural backgrounds are likely to differ in their understanding of certain concepts. Such effects are particularly likely if immigrants are interviewed in their second language. My MGCFA show that the two-dimensional social capital measurement model shows configural, metric and partial scalar equivalence across the native and the immigrant population in Germany: Factor loadings are the same, which indicates that the two groups apply the same metric. Only a few items show minor differences in measurement errors. There is, thus, no indication of increased randomness in the responses of immigrants as compared to natives. Non-western immigrants, however, use the scales of the social resource factor in a different way: The systematic component of the response bias (intercepts) differs, which might follow from increased affirmative responses behavior among immigrants. Accordingly, how differences in the means of observed variables translate into difference in means of the (latent) social resource factor differs across the two groups. Implications for both the interpretation of results and the design of social capital instrument are included. I, moreover, make a strong case for measurement equivalence testing in integration research and in the development of survey instruments more generally.

Consistent estimation of multilevel exponential-family random graph models

Michael Schweinberger (Rice University)

We consider two-level multilevel network data (e.g., students nested in schools) where level-1 units may have edges both within and between level-2 units. In practice, if the parameters of multilevel exponential-family random graph models are estimated from multilevel network data, the question arises whether the estimates of the parameters are close to the data-generating values of the parameters in some well-defined sense. We show that maximum likelihood

estimators are close to the data-generating values of the parameters with high probability provided the number of level-2 units is sufficiently large and the level-2 units are neither too small nor too large. We present results on both the mean-value parameters and the natural parameters. All results are non-asymptotic, based on concentration inequalities for dependent random variables. We present simulation results to demonstrate the performance of maximum likelihood estimators in practice.

The effect of network segregation on wage formation: the case of the Sri Lankan immigrant community in Milan, Italy

Valerio Leone Sciabolazza (Sapienza University), Raffaele Vacca (University of Florida), Luca De Benedictis (University of Macerata)

The aim of this paper is to delve into well-known results on the positive effects of social networks on job search and job match in immigrant communities. Following Granovetter's argument on the strength of weak ties, we explore the informational content provided by social networks of acquaintances and its effects on the economic performances of Sri Lankan immigrants in Milan, Italy. To this purpose, we collect information about personal networks and daily activities of 107 Sri Lankan immigrants in Milan. Analyzing co-location and intersection of activity spaces, we reconstruct the socio-centric acquaintance network of interviewed immigrants. Then looking at the national composition of immigrants' personal network, we derive a measure of the extent to which each person in our sample is exposed to the Italian community via Sri Lankan acquaintances. Finally, we estimate the impact of this measure (i.e. segregation index) on wage formation using a human capital model derived from existing literature on self-selection phenomena among immigrants. Our results confirm that being in contact with diverse social circuits (i.e. brokerage) has a positive and statistically significant effect on wage. At the same time, we find that this effect is less significant when information in each social circuit is more heterogeneous. In other words, the highest benefits are associated with either high levels of social network integration in the Italian society or high levels of network segregation within the Sri Lankan community. Thus, consistently with existing theories of social capital, economic performances increase with network integration within a national community. At the same time, integration within a single national community reduces the chances to benefit from the information provided by members of different community. A number of innovative robustness checks using both structural and Bayesian approaches are provided to assess the consistency of our econometric results.

Diffusion and discussion networks on Twitter: the case of protest meetings in Russia

Aleksandr Semenov (NRU HSE), Igor Zakhlebin (NRU HSE), Alexander Tolmach (Institute of Sociology of the Russian Academy of Sciences)

Although there is already a decent amount of network research on protest movements and revolutions on Twitter like #OccupyWallStreet and Arab Spring, similar Russian events in 2011-2012 have not been the subject of thorough scientific investigation yet. Therefore, this report presents the exploratory analysis of communication networks on Twitter during the protest meetings in Moscow.

The main goal of our research was to analyze and visualize networks of information diffusion and discussion about protest meetings in Twitter, revealing the discussion core, main sources and channels of information dissemination and most popular users in these networks. We've also compared our results with findings on similar protest movements in Spain.

For that purpose we've recorded tweets with hashtag "#24???" ("#24dec", 24th of December in Russian) during the political meetings on the 24.12.2011. We've chosen this particular date because two large meetings were planned that day. One of them was organized by the political opposition and the other was organized by the Government. This combination of two large and politically opposite events which took place in different places of Moscow on the same day provided a unique opportunity to compare communication structure and polarization around two opposing political forces, reflected on Twitter.

The dataset consists of 23 506 messages sent by 6 553 unique users. Based on this data we've constructed, analyzed and visualized the topological features and characteristics of key users of the discussion and diffusion networks, built from "replies" and "retweets" respectively. The data was obtained and combined from Twitter Streaming API and Firehouse, which makes it the most representative dataset on that events.

Among the key results of the analysis were very low percent of discussions, almost no overlap in key users of discussion and diffusion networks and signs of “Echo chamber effect” in the overall network of mentions. Although the main features of the network structure were mostly similar to the data on protests in Spain, we have found a huge difference in degree correlations which mean significant dissimilarity of communication patterns between influential and common users in both cases.

We discuss these and other implications of our research from both sociological and technological perspectives.

The Big Five Personality Traits in Network Formation

Brandon Sepulvado (University of Notre Dame), David Hachen (University of Notre Dame), Omar Lizardo (University of Notre Dame), Matthew Chandler (University of Notre Dame)

While social network analysis originally emphasized network structure to the detriment of nodal attributes, the situation has changed in the last several years. Sociologists of culture and networks show how actor dispositions, such as cultural tastes and religious orientations, influence the development of global network structure, and some scholars—even more recently—have begun to investigate how individuals’ personalities—an attribute even more durable than cultural tastes—impact network formation. Using data from a recently completed study in which an undergraduate cohort’s (N=206) mobile communication patterns were examined over a four year period, we utilize the exponential random graph model framework to investigate tie formation patterns associated with the Big Five personality traits. There are several interesting results. Individuals who score higher on openness tend to have a higher degree and connect with less open alters. Neuroticism is associated with a lower degree, yet it has no association with preferential selection based upon alters’ neuroticism. Agreeableness has a similar effect, insofar as those who score higher on agreeableness have a higher degree than individuals who are less agreeable and do not exhibit homophily regarding agreeableness. Finally, extraversion has an effect on network formation that is similar to openness. More extraverted individuals have a higher degree and connect with other extraverts less than less extraverted individuals. We conclude by noting the theoretical significance of these results and indicate fruitful directions for future research.

Simultaneous and Temporal Autoregressive Network Models

Daniel Sewell (University of Iowa)

While observation driven time series models for binary data have been studied for decades, this class of models has been slower to develop within the context of dynamic network analysis. A major complaint with this class of models for networks is the assumption that the dyads, or edges, are conditionally independent given the edge histories. This assumption is quite strong and is generally difficult to justify unless the intervals between time points are at a sufficiently fine scale. One would typically expect not only the existence of temporal dependencies through which the network at varying time points are dependent, but also simultaneous dependencies which help determine how the dyads of the network co-evolve. We propose a general observation driven model for dynamic networks which overcomes this problem by modeling not only the mean but also the covariance structure as functions of the previously observed edges. Both temporal and simultaneous dependence in the network are thus captured using an autoregressive approach. We also propose a visualization method which provides evidence either for or against the existence of simultaneous dependence. We describe a simulation study to determine the model’s performance in the presence and absence of simultaneous dependence, and we analyze a friendship network, a proximity network from conference attendees, and a world trade network using the proposed approach. We also use this last data set to illustrate how simultaneous dependencies become more prominent as the time intervals become coarser.

Evaluating network centrality using entropy tools

Termeh Shafie (University of Konstanz), Ove Frank (Stockholm University)

We recently introduced a new way of using statistical entropies to capture interdependencies among vertex and edge variables in multivariate networks. These entropies are used to systematically check for tendencies in the multidimensional variable set concerning redundancies, functional relationships, independencies and conditional independencies among different variable combinations. An important use of this technique is to apply it for selection of good summary measures of network structure. For instance, there are many alternative network statistics available for measuring centrality, and it is not always easy to decide which one is appropriate for a current application. In this presentation,

we consider different centrality statistics among the variables in the analysis. By using univariate and multivariate entropies, we aim to find the centrality measure that is most relevant for the network property of interest. Throughout this presentation, we use John Padgett's extended Florentine network data consisting of 87 families where the vertices as well as the edges have numerical or qualitative attributes defined on them. We create edge and vertex variables that capture network information via the most common centrality measures. The dependence structure of the variables is then explored by entropy analysis and it is determined which centrality measure is most appropriate for representing political, social or economic influence among the Florentine families. Further, we demonstrate how divergence measures can be used to indicate and test structural tendencies with respect to centrality in this network.

Rubrics: a mixed-methods approach to measuring and evaluating networks

Jessica Shearer (PATH), Emily Carnahan (PATH), Caroline Soi (Health Alliance International (HAI))

Network data are notoriously difficult to collect, even in settings where actors are known and relatively few. Missing network data render the interpretation of social networks very difficult, and comparisons between networks become particularly problematic. In this presentation we outline an approach used in the evaluation sciences known as rubrics. Rubrics are sets of criteria and scoring determinations used to evaluate performance, enabling analysis and interpretation when data sources are varied, data is of different types, and/or data are missing or heterogeneous in quality. The criteria (e.g. quality of technical assistance) and scoring determinations (e.g. excellent, good, poor) are set in advance with stakeholder participation, leading to greater buy-in and use of the findings by stakeholders. In the case of network analysis, rubrics can be helpful for dealing with the interpretation of network values in the context of missing data. We developed a rubric to guide the interpretation of network data collected from policy networks in three low-income countries. These networks captured working together, technical assistance, and information exchange relationships among stakeholders in national immunization policy domains, but all suffered from low response rates. The rubric was developed with participation from study funders and the wider research team. The criteria reflect the structural aspects of the network that we consider most relevant to its performance for the case of national immunization decision-making, planning and implementation: network cohesion, network openness, network diversity, network resilience, and network performance. Scoring determinations draw on network, qualitative interview and documentary data. Applying the rubric approach allowed us to interpret and report on the data that had been collected, and to compare networks across time and countries.

Gender differences in online network structure: A comparison of two virtual worlds

Cuihua Shen (University of California, Davis), Grace Benefield (University of California, Davis)

Virtual worlds allow users to assume identities that are unburdened by offline biases, thus potentially serving as "social levelers" that facilitate equal exchanges across genders. However, research suggests that they are not fulfilling their potential, and instead "gender gaps" that occur offline are also manifested in virtual worlds. Studies in various virtual worlds have produced descriptive statistics about how men and women differ in their socio-demographic profiles and behavioral styles (Williams et al, 2009, Lehdonvirta et al 2014), yet systematic examinations of how men and women engage in social interactions in these worlds remain scant. How do men and women build collaborative and socio-emotional relationships in these worlds? Does gender influence social network dynamics online, consistent with offline gender norms? These questions not only would help us better understand the extent to which gender disparities exist in these worlds, but also may illuminate how gender disparities come into existence as player networks develop and mature over time.

This study will consider these questions by examining how women and men's social networks in virtual worlds differ, and whether such gender differences may be associated with individual performance in virtual worlds. Drawing from literature on gender roles and homophily, we examine social networks in two virtual worlds in two national cultures, offering a comparative approach rare in previous research. It will draw from large-scale longitudinal datasets from EverQuest 2 as well as Chevaliers' Romance 3, in North America and China, respectively. Multiple social networks will be reconstructed based on behavioral data provided directly from the game creators. Large-scale surveys of the same player populations will also provide additional data on demographics and attitudes.

The Company We Keep: Experimental Evidence on Network Change from 56 Middle Schools

Hana Shepherd (Rutgers University)

The importance of peers in shaping behavior and identity among adolescents is well documented (e.g., Giordano 2003). This paper uses a unique, multi-level field experiment in 56 middle schools (N=24,191 students) to examine causal influences on friendship change over time. The experiment was designed to test whether changing the behavior of highly visible students could influence other students' perceptions of social norms of conflict and shift overall levels of conflict behavior at the school. To do this, we randomly assigned half of 56 public middle schools (students ages 10-15 years old) throughout the state of New Jersey to receive an intervention program in which a randomly selected group of students, the intervention group, met with program managers biweekly to participate in discussions and activities related to improving peer relationships and addressing peer conflict at their schools (see Paluck, Shepherd, and Aronow 2016).

The intervention could affect patterns of friendship through two pathways. First, the intervention allowed students who may have previously not had regular contact with each other to get to know each other through activities and discussions every two weeks. Previous research illustrates the importance of opportunities for high quality interaction and collaboration toward a common goal for creating friendships (e.g., Festinger 1950). To the extent that these students come from different social groups and make new friendships, they may provide new ties between previously unconnected groups of students. This may create more change in ties in intervention schools. The second key feature of the intervention relevant to changing social networks was the content of the program, which focused on how to help students create positive social ties. Program activities encouraged treatment students help friends feel accepted and valued, and to spread this ethos to other students at the school beyond friends. Based on the program content and the emphasis on supporting existing friends, we would expect greater tie permanence in treatment schools. Regardless of the direction of change, we might expect these changes to occur primarily among treatment students and their friends. To the extent that the message of the intervention program spread beyond those assigned to lead it as it was designed to do, then we would expect changes in the friendship practices among a broader group of students in schools that received the intervention.

Measured at either the school level or the individual level, being in a treatment school (a school which received the anti-conflict intervention) decreased the percentage of network nominations at time 1 that persisted to time 2. The effect was not driven by a change in the number of total nominations in treatment schools, and the effect occurred among both intervention students and non-intervention students in treatment schools. I find heterogeneous effects of the treatment on changing friends based on school size and the poverty concentration in the school. I discuss the meaning of changing friends in these schools, possible explanations for the experimental findings, and I assess how this evidence informs our theories of network change.

How music genres are perceived and reconstructed in the consumer market?

Yongren Shi (Cornell University)

Music genres are often seen as a product of collective enactment by musicians and entertainment companies on the production side, but little is known about how the audience collectively accepts, consumes, transforms and rejects a genre. The limitation is often not theoretical, but methodological. Without a comprehensive dataset about consumers' behaviors and their social networks, and without a proper set of methods to distill sociologically relevant information, it is extremely difficult to assess the impact of audience on the evolution of music genre. In this study, I collected two networks from Twitter.com, a following network of 2400 U.S. based musicians who have at least 10,000 followers and a communication network among the audience (53 million unique users) who follows at least two musicians. Different from opinion surveys, which solicit opinions via an introspective lens, following relations on the Twitter are a behavioral indication of preference, which is not only more accurate but also relational. By applying an innovative measure of co-following relation to the two-mode network of musicians and followers (network one), I constructed a similarity matrix of musicians, from which the boundary of genre emerges. While the pattern of music genre generated based on consumers' preference is largely aligned with the genre information of musicians listed by the entertainment companies, the structural properties, e.g., cohesiveness, the extent to which genres overlap with one another, diversity, centrality, vary greatly across different genres. For instance, country music is highly clustered and separated from others. An analysis of the communication network of audience, as the network ties are measured by the two-way at-mention between consumers, reveals a similar pattern. Because the construction of communication network (network two) is independent of the two-mode network of musicians and followers (network one), the results

suggest a correspondence between social network of audience and cognitive map of music genre. Additionally, this study examines how the taste diversity (measured by genre) and structural diversity (by network) of consumers affect the consumption pattern of music.

Diffusion of Social Media Among International Nonprofit Organizations

Jieun Shin (USC), Mina Park (USC), Wenlin Liu (USC)

Despite the widespread use of social media in the nonprofit sector, little is known about how nonprofit organizations adopt a particular social media platform over time. In an attempt to shed light on the diffusion of social media among NPOs, this study draws on diffusion of innovations theory (Rogers, 2003) and signaling theory (Spence, 1973) in investigating the mechanisms underlying the adoption process. Specifically, we examine the effects of the network-level characteristics (i.e., the structure and composition of an organization's alliance network) as well as the individual organizational-level attributes (i.e., organizational status and financial resources) on Twitter adoption over the course of seven years.

Our dataset was comprised of 419 international governmental and non-governmental organizations and their Twitter adoption patterns ranging from 2008 to 2015. We consulted the Union of International Associations (UIA) and initially identified 48 NGOs whose main activities involve promoting and protecting the rights of children. Then, we expanded our dataset to include 47 seed organizations' alliance partners based on UIA's online database published in 2009. This included the nature of relationships between organizations (e.g., collaboration, finance, and consultation), organizational age (i.e., history), organizational type (i.e., IGO and NGO), consultative status, and financial resources (e.g., the number of paid staff).

By visiting each organization's website, we found that, out of 419 organizations, 236 organizations (53.6%) owned Twitter accounts and followed at least on another user. These organizations' Twitter account information (e.g., the date on which the account was created, the number of followers, the number of followees, and the number of messages they had posted) was subsequently retrieved using a script in Python programming language from Twitter search API in May 2015.

Our analysis focused on two perspectives. First, guided by signaling theory, we examined whether NPOs used Twitter as a visible signal to strategically communicate their underlying quality to the stakeholders. Using a logistic regression with Twitter adoption as the dichotomous dependent variable, we found that, consistent with signaling theory, organizations that depended on donor funding were more likely to use Twitter than organizations that relied on other funding sources such as foundations and governments. Furthermore, we also found that the likelihood of adoption decreased if the organization gained consultative status after controlling for other factors such as organizational age. Second, we investigated what factors were associated with the timing of Twitter adoption based on the diffusion of innovation literature. We ran a series of multivariate regression analyses in which we assessed the extent to which the adoption timing varied by organizations' network positions. The results showed that better-connected organizations (i.e., measured by degree centrality) were likely to adopt Twitter earlier and use it more frequently, with globally influential organizations falling into the early adopters category.

In sum, our research findings suggest that researchers should emphasize normative perspectives of NPOs' new media use as well as self-presentational aspects of communication technologies in the non-profit sector.

Title: Effects of Externalizing Behavior and Internalizing Behavior on friendship networks among children

Heesung Shin (USC), Jimi Huh (USC), Thomas W. Valente (USC)

The main goal of this study is to explore how one's social network position in a classroom changes in relation to internalizing and externalizing behaviors. We will also explore the reverse direction examining how behavioral problems affect social network positions. Participants were 933 children residing in Southern California. Longitudinal cross-lagged models tested the association between CBCL measures (externalizing/internalizing) and in-degree, out-degree and ego-reciprocity network measures at two time points (5th grade and 6th grade). All models controlled for a set of covariates, including gender, ethnicity (Hispanic), and SES (free lunch status). Preliminary results showed that externalizing behaviors at 5th grade were negatively associated with 6th grade popularity (i.e., in-degree scores) and 5th grade popularity was negatively association with externalizing behaviors at 6th grade. Receiving more nominations

by peers was associated with fewer internalizing behaviors, but internalizing behaviors at 5th grade were not predictive of later popularity. Future analyses will fit additional social network measures using out-degree and ego-reciprocity. The findings will be among the first to understand the effect of longitudinal behavioral problems on peer relationships and the reversed effect among children using social network analysis.

How consumers and activists amend their semantic networks

Michelle Shumate (Northwestern), Amy O'Connor (University of Minnesota)

The purpose of this research is to examine how consumers and activist construct semantic networks about nonprofits and corporations and, then, when they are presented with a partnership between the corporation and nonprofit, how they amend those networks. We asked two inter-related research questions (1) How do consumers and activists' associative networks of both NGOs and corporations differ? and (2) How do individuals resolve incongruity in response to a NGO-corporate partnership (i.e., assimilation, restructuring associative networks, new associative links)?

Methods Participants and Procedures We recruited 631 women age 25-54 with a combined household income of greater than \$50,000 via a Qualtrics panel. These women represent an important consumer group because they are the primary decision makers in household financial decisions. We used a screener question to recruit a quota of activists and consumers into the panel. We asked participants: "Would you describe yourself as someone who is actively involved in promoting (please check all that apply)? Participants who selected one of three social issues were considered activists (n = 314), with six options given. Participants who selected none of the above (n = 317) were considered consumers.

Participants were randomized into a Pre-test/Post-test 2 X 9 with an offset control design. The first factor describes the participant type (i.e., active moms or activists). The second factor describes one of nine stimulus conditions: (1) ConocoPhillips and The Nature Conservancy, (2) ConocoPhillips and American Heart Association, (3) ConocoPhillips and Boys & Girls Club, (4) Costco and American Heart Association, (5) Costco and The Nature Conservancy, (6) Costco & Boys and Girls Club, (7) Phillip Morris International and Boys & Girls Club, (8) Philip Morris and the American Heart Association, and (9) Philip Morris & The Nature Conservancy. Industry and NGO pairings were chosen based upon the previous research. Participants in the control condition answered questions regarding "nonprofits" and "corporations."

Participants completed a BrANDi (i.e., Brand Associate Network Diagram) for the nonprofit and corporation assigned in their condition. Then they were exposed to three news stories. One of the news stories was a manipulation that describe a corporate sponsorship of a walk on behalf of the nonprofit. The control condition described a walk for health communities. After the manipulation, participants completed a combined BrANDi for the two organizations.

Measures and Analysis For the first research question, we examine the number of words, number of links, and types of words participants include in the semantic network. For the second research question, we examine the ways that activists and consumers change their semantic networks in response to the stimuli. Assimilation describes adding nodes to the semantic networks post-test to resolve incongruity. In particular, we are interested if participants add a node to the semantic network previously assigned to the partner. Accommodation describes either adding links between two cognitive maps or created an entirely new semantic network to address the incongruity. Peripheral processing is indicated by not making any changes to the associative network or adding simple descriptive information based upon the stimulus.

Marketing Ecologies and Hashtag Structure in Commons Based Ecommerce Sites

Emily Sidnam (University of Southern California)

This paper shows how an ecological perspective and evolutionary principles prove useful for explaining hashtag structure within an organization's marketing efforts. To explore how hashtag structure might reflect the offline organizational structure and various motivations within the community, this paper provides a case study of hashtag structure for a commons based ecommerce site. These types of sites (e.g., Etsy, Threadless, and Redbubble) have unique organizational forms which affect the structure of their marketing ecosystems, particularly the formation of hashtags. This paper's overarching research question explores how the structure of interactions in an organization's official hashtag reflect the relationships and motivations at the community level. Several hypotheses are presented to test how hashtag content and structure are predicted by the symbiotic and competitive relationships in the offline

community. For example, this paper draws upon evolutionary and ecological theories and past research on hashtags to create a taxonomy of nodes and related ties for the hashtag ecology of a commons based ecommerce site. The five a priori categories include: Organization, Promoter, Fan, Supporter, and Highjacker.

This research uses a combination of thematic analysis, visualization, and network analyses to explore the research question and test the hypotheses. Thematic analysis was used to code the nodes and ties based on type of contributor and interaction, beginning with the five a priori categories and adding categories as necessary; each node was coded based on the content from the node's tweet, information from the Twitter profile associated with the node, and contextual information from the organization's website. NodeXL and R were used to create the visualizations and conduct the analyses. The final data for this case study consist of four directed networks; each network represents one week of tweets and interactions on a commons based ecommerce site's official Twitter hashtag (capturing one month of interactions). The overall findings provided substantive insight into the research question and supported the five hypotheses.

The categories informed by attending to populations within the hashtag community were able to explain 97% of the nodes. As hypothesized, the largest population of nodes in the hashtag niche was the Promoters. The network also consisted of both the organization's word of mouth (WOM) resources (Fans) and Promoter's WOM resources (Supporters), as predicted. Lastly, each network displayed the presence of Highjackers. In the manner predicted, the structure of interactions in the networks reflected the relationships and motivations at the community level for a commons based ecommerce site, as well. This paper shows that applying evolutionary and ecological principles to a marketing ecosystem is useful for predicting the types of participants and interactions in an organization's hashtag network.

Knowledge system regarding social learning amongst stingless beekeepers in Veracruz, Mexico

Rae Simms (INECOL, A.C.), Luciana Porter-Bolland (INECOL, A.C.), Alfonso Langle-Flores (INECOL, A.C.)

The learning components of stingless native bees management registered in the knowledge system shared by 194 beekeepers were examined. A historical context in Atzalan, Veracruz, Mexico, where the study was conducted, includes beekeeping as a traditional activity. Here, a collective memory based on oral tradition as a learning mechanism is part of the ecological knowledge system. Through social network analysis, I identify patterns of local learning mechanisms and learning components in the traditional ecological knowledge system of beekeepers. A socio-ecological context is shared in the imaginary statement of stingless beekeepers. To understand these learning mechanisms, a knowledge system network was built with the help of software display graphs (UCINET 6 - SNA statnet R). This network served to identify patterns of social learning within beekeepers, as well as the structures of bee management that are recorded in the collective memory, in order to understand that the ways knowledge is learned is always changing. There is a sub-flow of traditional ecological knowledge concerning the management of native bees among beekeepers and it supports a second sub-structure based on technical knowledge that has recently have available for some beekeepers through training courses, meetings and workshops, as part of external extension programs. The low density reported for the network (0.009), means that the diversity of management practices among beekeepers is high. The low density also implies risks of maintaining network sectors under duress, as the case of periphery nodes. In general, diffusion of knowledge is limited to the nearest nodes, defined primarily by geographical proximity. Stingless beekeeping in Atzalan is an activity of traditional character and is integrated into a system of activities that is chosen by households. The knowledge system has favored those actors interested on improving the performance and production of stingless bees through external training, enabling them to have a privileged position in the network because they have more connections. However, many nodes in the periphery are less connected because their knowledge system has been inherited. The core of the network provides its structure, which may induce homogenization of the activity in the long run, but it also provides technical innovation, thanks to their experience and the ability to integrate new knowledge. They make information accessible to other actors, but also sometimes it gives them power over other players that have less links. These few actors have taken training but most of these have been in contact with beekeeping since childhood. In the peripheral sub-network, the links occur between family members. In this case, few connections exist as a result of the knowledge system, that has a foundation of orality where the activity emanates and in which much of the knowledge is traditional. These peripheral nodes can be as well knowledgeable, but their position in the network is determined by a family hemophilia, based on traditional beekeeping, which can limit the transmission of information between actors of other locations or even families in the municipality.

Incentivizing online consumer engagement for public health messages

Helen Siuki (Macquarie University), Cynthia Webster (Macquarie University)

Today companies take advantage of online social networks by using social media marketing tools to engage consumers and excite electronic word-of-mouth. Companies benefit by allowing consumers to comment, like and share product and brand messages throughout their online social networks. Stimulating online engagement for public health messages is especially challenging. Public health messages typically deal with sensitive issues and difficult lifestyle changes such as HIV testing, smoking cessation and alcohol reduction. Offering incentives and using different message appeals are common promotional tactics, yet little is known about how these come together to influence consumer engagement and message diffusion. Much of the online engagement research focuses on the actions of individuals and overlooks the network structure of social interactions. The aim of this study is to investigate the ways in which incentives and message appeals influence the network structure of online consumer engagement for public health messages within social media networks. An experiment conducted on Facebook manipulated three incentive conditions (monetary versus non-monetary versus social recognition) and presented two message appeals (informative versus fear). The monetary condition offered a chance to win a \$50 gift card, the non-monetary condition was a chance to win two movie tickets and the social recognition condition presented the opportunity to be featured on the “wall of fame”. In total 130 student subjects were randomly assigned to one of four Facebook groups, three incentive groups and one control group. Group size ranged from 32 to 33. Subjects in each group were simultaneously exposed to the same two public health messages on the negative effects of smoking, one message framed as an informative appeal and one fear appeal. Subjects were instructed to take part in the online discussion by sharing, commenting and liking posts on the Facebook page. Results show monetary incentives stimulate the highest overall online engagement with 101 posts followed by non-monetary incentives with 92 then social recognition with 71 and 55 posts for the no incentives control group. Across all study conditions findings indicate fear appeals promote greater engagement compared to informative appeals. A visual inspection of the 2-mode networks reveals structural similarities among those who engage online. The monetary and non-monetary networks for both fear and informative appeals have one large component with only a few pairs whereas the control and social recognition networks contain many small components. With regards to network density, monetary and non-monetary networks are relatively more dense (0.133 and 0.119, respectively) compared to social recognition and control networks (0.065 and 0.047, respectively) and networks responding to fear appeals are more dense than informative appeals in all but the monetary incentives condition where the reverse occurred (0.123 for informative and 0.105 for fear). These findings highlight important structural differences of online engagement. This study examined online engagement on Facebook with a small student sample over a brief time period for one health issue. Additional research is needed to validate study results using different online platforms for other health issues and to overcome study limitations of sample size and engagement length.

Social Disorder and Network Dynamics among Young Black Men who Have Sex with Men

Britt Skaathun (University of Chicago), John A. Schneider (University of Chicago)

Background: Young Black Men who have Sex with Men (YBMSM) age 16-29 are heavily impacted by HIV infection in the United States. Exposure to adverse environmental factors may result in unstable social networks, which have been associated with poor health outcomes due to their weak, ‘disposable’ nature. Factors related to social disorder are of particular importance when assessing the formation of social networks because they lead to, “undesired” changes in networks, such as the loss of a close confidant due to death or criminal justice involvement (CJI). The current analysis assesses how social disorder factors, such as unstable housing, CJI, and exposure to violence, affect the composition of the social networks of YBMSM in South Chicago.

Methods: Respondent Driven Sampling (RDS) was used to recruit 618 YBMSM between June 2013 and July 2014 in South Chicago. Eligibility included Black identity, Male at birth, age 16-29, and engagement in oral or anal sex in the past 24 months. Effective size, a bridge metric which counts the number of, “non-redundant contacts in an individual’s network” was the dependent variable. Bridge metrics are useful for assessing network instability because the bridging position tends to be temporary. In the context of infectious disease transmission, bridges serve as essential targets for reducing disease transmission because they introduce disease to multiple clusters of susceptible individuals. This analysis assesses the impact of factors that involuntarily generate bridge positions and network turnover. A logistic regression analysis weighted by general probability estimates was used to assess associations between social disorder factors and effective size. The model controlled for age, income, and ethnicity.

Results: HIV positive serostatus in the sample was 32%. Mean age was 23, 88% had at least a high school degree, 84% were low-income (<\$20,000/year), 25% demonstrated housing instability in the past 12 months, 60% were victims of violence in their lifetime, 61% had 1+ close confidants die violently in their lifetime, 46% reported CJI in their lifetime, and 21% reported CJI 2+ times in their lifetime. Greater Effective Size (> sample mean of 2.7) was associated with higher rates of CJI [adjusted odds ratio (AOR) 1.65, 95% CI 1.02-2.64] and being the victim of violence [AOR 2.10, 95% CI 1.28-3.45].

Conclusions: Adverse social factors, such as criminal justice involvement and exposure to violence, are associated with network instability, as measured by effective size. Targeting those with CJI or exposure to violence may be an effective way to reach people who are HIV positive due to the link between network instability and bridging established here, coupled with the association between bridging and HIV positivity established elsewhere. In addition, the high prevalence of CJI and exposure to violence indicates that violence prevention which engages sexual minorities may be worthwhile.

The Pause that Refreshes: Biased Net Models for Renewing and Re-igniting Social Ties

John Skvoretz (University of South Florida)

A social tie is conceptualized as a charge carrying entity whose active involvement in a network requires periodic renewal or recharging. Absent regular recharging, a tie's bonding force disappears and the connection's active involvement in a network moves to a quiescent state and goes dark. Being in such a state, however, may enhance the chances that the bonding force can be re-ignited as compared with those chances when the dyadic state is one in which no history of connection exists. I formalize this conceptual scheme using the machinery of biased net theory and evaluate specific models for the recharge and re-ignition processes' on school friendship data at four points in time originally collected by Cook (1945). The models interrogate the usual suspects (homophily, reciprocity, transitivity) as explanatory factors for recharging and re-igniting.

Modeling measurement error in ties and attributes using ERGMs

Andrew Slaughter (US Army Research Institute), Janie Yu (Independent)

In network analysis, an especially important model for the statistical analysis of networks are exponential random graph models (ERGMs). ERGMs allow researchers to model the likelihood of observing particular networks in terms of theoretically or analytically important subgraph configurations. Despite some lingering issues related to model degeneracy, they remain one of the most powerful and flexible tools researchers have for the statistical analysis of complex networks. However, current approaches to analyzing networks using ERGMs do have some limitations.

Like many other standard statistical models, ERGMs incorporate assumptions about measurement that may be unrealistic. This is analogous to models like standard linear regression; in standard regression, covariates are assumed to be measured without error. Of course, instruments always contain error – this is especially true in the case of social science research, where our instruments typically consist of a small number of self-report items designed to capture broad, hard-to-define constructs.

To deal with this reality, researchers have developed a wide array of techniques for modeling and incorporating measurement error into broader models; this includes techniques such as error-in-variables regression, as well as more complex latent variable methods like such as factor analysis, item response theory (IRT), and structural equation modeling (SEM).

Using a hierarchical Bayesian framework, it is possible to relax certain assumptions about measurement, and to combine multiple networks and multiple relations into smaller underlying models. Specifically, we will present ERGMs that model latent ties and latent actor attributes, taking into account larger sets of observed networks and actor attributes by integrated structural equation models (or other latent variable models). We will discuss how such models may be motivated and defined, and present example analyses of real-world multi-relational, multi-attribute networks.

Cross-buying customer behavior in internet shopping in Russia from the network perspective

Igor Sloev (Higher School of Economics), Artyukhova Elena (Higher School of Economics)

In this paper we analyze patterns of cross-buying behavior in internet shopping in Russia from the network perspective. We use representative data collected by the Russian Public Opinion Research Center in 2011-2013. We construct a weighted network, where nodes represent the categories of goods purchased. Between two nodes exists a link if there is at least one purchaser, who bought both goods from these categories. Weights of links correspond to the numbers of buyers purchased goods from both categories. In order to detect categories of goods, what are purchased together we divide the network of categories to modules using two community detection algorithms: the modularity maximization algorithm (Newman 2006) and the generalization of the Newman-Girvan algorithm for weighted networks (Newman 2004). The results may be used for marketing purposes; in particular they allow determining an effective placement of internet advertising for firms selling different categories of products through internet and helps to determine a maximum price that firm may afford to pay for such advertising.

Fragmentation of Production and the Competitiveness of Nations in the Automotive Sector - A network approach

Matthew Smith (University of Greenwich)

In recent decades the organisation of production has changed, with production and manufacturing activities no longer taking place in a single location, with lower transportation and communication costs leading to production activities geographically spread out into a global value chain. This reorganisation and fragmentation of the production process has led to increased sources of competition at the international level, with many firms from industrialised nations increasing their level of outsourcing and off-shoring of lower value activities to developing countries. Along with the increase in outsourcing activities, many industrialised nations are also now facing increasing competition from developing countries, who are steadily developing capabilities, in which industrialised nations once held a firm competitive advantage. This paper makes use of network analysis of the international trade network to analyse the competitive level of countries in the automotive industry, and to answer the research question of to what extent is the competitiveness level of a country determined by its position within the international trade network. The application of the temporal network autocorrelation model (TNAM) will be used to answer this question, this is an advanced statistical method that provides a highly flexible framework to model the competitiveness of nations embedded in an international trade network.

When friendship turns sour: the effect of interethnic friendship dissolution on interethnic attitudes

Sanne Smith (Stanford University and Utrecht University)

Having interethnic friends is one of the strongest predictors of positive interethnic attitudes, but there is little research that examines the development of interethnic friendship and interethnic attitudes over time. Friendships do not always last forever and several studies suggest that especially interethnic friendships are more likely to end. In order to fully understand the value of interethnic friendship for societal cohesion, it is important to examine what happens to interethnic attitudes when interethnic friendships end. In addition, as negative experiences may trump an initial positive experience, it is also valuable to focus on the friends that turn into foes. This study examines how interethnic attitudes are affected by interethnic friendship dissolution using longitudinal data of 8,139 adolescents in 502 English, German, and Dutch high school classes. I use Stochastic Actor-Oriented Models (SOAMs) to test my hypotheses. Preliminary results show that interethnic friendships end more often than same-ethnic friendships, but only few of these become negative ties. Students who lose interethnic friendships have slightly less positive interethnic attitudes than students who maintain interethnic friendships, but their interethnic attitudes are still higher than students who never had interethnic friendships. These findings suggest that the maintenance of interethnic friendships is important in boosting positive interethnic attitudes, but that even short-term interethnic friendships have a lasting positive effect on interethnic attitudes.

Estimating Contextual Effects from Sampled Ego Network Data

Jeffrey Smith (University of Nebraska-Lincoln)

Studies as far back as Durkheim have explored the effect of cohesion on health related outcomes, such as depression and suicidality. For example, do more socially cohesive schools have lower rates of depression? Such questions are deceptively difficult to answer, however, due to the data requirements of a full test of this idea: a researcher would

have to collect full network data in every context, a tall order by any survey method standard. The goal of this paper is to make it easier for researchers to incorporate network structure into typical regression models. Specifically, we ask whether it is feasible to use sampled network data to explore the contextual effects of network properties on individual outcomes, such as cohesion on mental health. A researcher would first collect sampled network data in multiple contexts. They would then infer the network structure in each setting, using those estimates to measure contextual variation in cohesion. Cohesion would then be used as a contextual level predictor of health, suicidality and the like, at a much lower cost than a traditional network survey. We test the practicality of this idea using a controlled experimental design, where we apply the simulation approach introduced in Smith (2012) to the question of contextual effects; the approach uses sampled ego network data to make inference about the global features of the true, unknown network (such as cohesion). The question is whether this approach is accurate enough to offer valid estimates of the effect of cohesion on mental health. We use 129 Add Health networks as our test case. We take the complete set of adolescent friendship networks and estimate a model predicting mental health as a function of individual and network (or school) level predictors—specifically cohesion, measured as the size of the largest bicomponent. We find, using HLM, that individuals are generally less likely to be depressed if they are in more cohesive networks. However, this effect is not uniform: it is worse to be an isolate in a cohesive school (being not part of the crowd) than a more fragmented one (where it is easier to not fit in). We then test if we can produce the same estimates using a network sampling approach. For each school, we take a 10% random ego network sample, run the simulation method, and measure cohesion. We then take those inferred measures of cohesion (across schools) and use them to estimate our model of mental health, isolation and cohesion. We then compare our estimates using the sampled data to the true estimates using the full, known network data. We ask if the sampled estimates approximate the true estimates well. The larger question is whether one can use independently sampled ego network data to measure global network features, making it easier to incorporate contextual network features into typical regression models.

The role of gender, strength of ties, and multiplexity on syringe sharing among young persons who inject drugs

Jasmine Smith (University of Illinois at Chicago School of Public Health), Basmattee Boodram (University of Illinois at Chicago School of Public Health)

Introduction. The quality of relationships between persons who inject drugs (PWID) and their social network members has been shown to predict patterns of injection equipment sharing. However, limited data exists on the role of gender and overlapping (multiplex) support and drug networks on the association between strength of ties and syringe sharing. The purpose of this study is to assess the association between level of trust (a measure of relationship tie strength) and syringe sharing among male and female PWID and their drug injection and support network members.

Methods. A cross-sectional, egocentric study (n=164) was conducted on the drug-using and support networks of young (ages 18-30), active (injected drugs in the past 30 days) PWID. We restricted our analyses to male and female participants who reported having at least one injection network member with whom he/she injected more than once with in the previous 6 months (n=147, 90%). Most participants were registered members of a large Chicago syringe exchange program with 5 locations in major outdoor heroin and cocaine markets. Level of trust was measured by asking each participant to rate the level of trust he/she had in each network member (scale: 1-10, 1="don't trust at all", 10= "trust with my life"). Syringe sharing was examined as dichotomous variable (any vs. none in previous 6 months). A multiplex relationship was defined as having a drug injection network member who was also a support network member, and was also a dichotomous variable (any multiplex relationships vs. none). Logistic regression using generalized estimating equations (GEE) was performed to adjust for clustering of network members on the ego in SAS, v. 9.4.

Results. Participants had a median age of 26, were mostly male (65%), non-Hispanic White (71%), had a median network size of 3, and almost half (44%) had at least one multiplex relationship. Injection network members (n=559) were also predominantly male (66%), non-Hispanic white (70%), and were slightly older (mean age of 29.7). In a multivariable model that adjusted for age, race/ethnicity, and injection network size (all non-significant, but included based on literature) both gender and multiplexity modified the effect of level of trust on syringe sharing. Among male and female PWID without multiplex relationships, the odds of syringe sharing increased significantly with each increasing level of trust; additionally, the odds were the highest among females (odds ratio [OR]=1.46, 95% CI 1.25-1.70 for females, OR=1.19, 95% CI 1.05-1.35 for males). Among males and females with multiplex relationships, level of trust was not significantly associated with syringe sharing (p=0.62 for females, p=0.22 for males).

Conclusions. Our study supports that level of trust in the absence of multiplex relationships may be an important risk factor for syringe sharing, especially among young female PWID. Future interventions aimed at altering social norms around syringe sharing should target relationships involving high levels of trust in addition to those within overlapping risk networks.

Predicting Respondent Precision of Geographic Locations

Emily Smith (University of California, Irvine), Carter Butts (University of California, Irvine), John Hipp (University of California, Irvine), Nicholas Nagle (University of Tennessee, Knoxville)

Understanding the geography of social networks requires measuring not only social ties, but also the locations of the individuals involved; for many sorts of networks, surveys remain the tool of choice for obtaining such information. In a survey where respondents are asked to report the location of themselves or others, spatial uncertainty will undoubtedly factor in into the measurement (whether due to obfuscation by the researcher or imprecision on the part of the respondent), which in turn has important implications for the analyses of the researcher. Using data from the American Social Fabric Study, a spatially stratified egocentric network sample of respondents in the western United States, we fit OLS models predicting precision of both one's own place of primary residence (ego), as well as those of one's social ties (alters). As each individual is geocoded to a spatial polygon, we use two measurements of precision: (1) root mean square distance (RMSD) of sampled points within the polygon to the average point estimate, and (2) polygon area. We test variables related to ego demographics, alter demographics, as well as those related to the geography of the polygon. We find that geographical context of the region (e.g., population density and whether or not the polygon is in the United States) appears to be most important when predicting both measures of precision. We also find evidence of a combined privacy/vulnerability effect, whereby respondents with more education tend to give less precise self-locations, with this effect compounded when the respondent is non-white (a more vulnerable population). This is further supported by findings that respondents who decline to state their income or have at least one child tend to report less precise locations, as well as the finding that those who perceive their neighborhood as more safe report more precise locations.

Eco-network extensity and community attachment among recent refugees in Albuquerque

Brian Soller (University of New Mexico), Jessica Goodkind (University of New Mexico), Christopher Browning (The Ohio State University)

Ecological and community-based interventions are grounded in the logic that improving the fit between individuals and their social environments enhances individual well-being. Similarly, much "neighborhood effects" research suggests overlap in residents' routine activity settings promotes neighborhood attachment and assessments of collective efficacy. We integrate insights from the eco-network approach to neighborhood organization and ecologically-informed intervention strategies to test the association between levels of overlap among refugees' routine activity settings and their subjective attachment to co-ethnic community members. Using data on routine activity settings among 82 participants from the Refugee Well-Being Project—an ongoing randomized community-based intervention aimed enhancing mental health among refugee adults in Albuquerque, NM—we first measured the eco-network among our respondents. This eco-network is a two-mode network that comprises study participants who are indirectly connected through shared participation in routine activity settings, which are specific locations (e.g., childcare centers, grocery stores, etc.) that participants visit throughout their daily routines. We then projected the eco-network to measure individual eco-network extensity—which captures an individual's capacity to overlap in activity settings with other community members. Respondents with high extensity have more potential for encountering fellow community members throughout their daily routines. Findings from regression analyses indicate that eco-network extensity is positively associated with respondents' subjective attachment and perceived support from co-ethnic community members. These results suggest that increasing opportunities for social overlap in routine activity settings may increase recent refugees' attachment to fellow community members, facilitate social capital, and improve the fit between refugees and their social environments during the resettlement process.

Institutional Contingency of Network Embeddedness of Class Identification: Network Members' Occupational Status and Subjective Social Class in Three Societies

Lijun Song (Vanderbilt University), Ruoh-Rong Yu (Academia Sinica)

Does network members' occupational status promote or demote subjective social class across societies? This study examines four hypotheses using nationally representative data simultaneously collected from the United States, urban China, and Taiwan. Social identity theory expects both absolute and relative accessed occupational status (i.e., the number of higher and lower accessed occupational positions) to advance subjective social class. Social capital theory anticipates absolute accessed occupational status and the number of higher accessed occupational positions to promote subjective social class and the number of lower accessed occupational positions to do the opposite. The relational dependence argument predicts social identity and social capital theories to be more applicable to the two Chinese societies than to the United States. The inequality structure argument expects social identity theory to be more applicable to Taiwan than to the other two societies. It predicts social capital theory to be more applicable to Taiwan than to the other two societies in the analysis of absolute occupational status and the number of higher accessed occupational positions but the opposite in the analysis of the number of lower accessed occupational positions. Results on absolute accessed occupational status and the number of higher accessed occupational positions support social identity and social capital theories in the three societies. Results on the number of lower accessed occupational positions support social identity theory in Taiwan. Across the three societies, results support the inequality structure argument.

The Fifteen Days: How a Protest Theme Emerges in Communication Networks?

Eunkyung Song (Rutgers University)

This project examines how individuals on an anonymous discussion board form a political goal and group boundaries associated with the goal by employing both topic modeling and network analysis on a collection of posts produced during the 2008 Candlelight Protests in Korea. In particular, it focuses on the first fifteen days of the Protests from April 18, when Koreans learned about new inspection standards for importing beef products from the United States to be introduced, through May 2, when a first street rally that disagreed to the standards took place. Using quantitative analysis techniques to handle a large corpus of texts produced in AGORA (an anonymous, free, and open discussion board run by Daum corporation) during the designated period of time, this project examines how AGORA users generated semantic domains with which they defined the beef issue as a broader public issue for popular protest. I aim to demonstrate that semantic and dialogue networks co-construct each other over time within a specific communicative setting. On one hand, I examine how AGORA users address and contextualize an issue of beef importation in different ways over time by linking it to relevant topics and separating from irrelevant topics from their perspectives. To specify semantic networks addressing the beef issue, I employ topic modeling that detects the latent structure of a collection of documents by generating probabilistic distributions of co-occurring terms that are called topics (or themes). Instead of assuming that a cohesive and coherent understanding of what the beef issue would mean had existed before any relevant dialogues started, I show that the beef issue kept on being told and re-told in various perspectives, and converged on a cohesive narrative later. On the other hand, I test a hypothesis that dialogue patterns influence the emergence of coherent thematic clusters (e.g., the beef issue). In so doing, I focus on three types of dialogue patterns (1) isolates (with no responses), (2) dyads (i.e., a post with a response), (3) triads (i.e., a post with two responses), and (4) stars in various sizes. By testing ERG models, this project shows meaning-making process in an anonymous discussion board is related to dialogue patterns. This project has both theoretical and empirical implications. Firstly, it argues that the dynamic of communication network has to do with what its participants communicate to others and how those subjects are interpreted. Second, studying a communication network should consider communication settings within which it is formed because the setting itself (e.g., anonymity-based vs. SNSs-based network) affects the ways a topic becomes popular and how the popular topic becomes a public issue that assumes a certain type of group boundary. Thirdly, this project shows that AGORA users in the very fledgling stage of the Protests had different ideas of what the beef issue meant to them, comparing to the ways the issue was addressed later.

Emotion Homophily in Online Discussion Networks: A Networked Approach to Studying the Expressive Behaviors of Social Media Users in China

Yunya Song (Hong Kong Baptist University), Xinyu Dai (Nanjing University), Jia Wang (The Hong Kong University of Science and Technology)

This study attempts to investigate the online expressive behaviors of social media users in China. Specifically, we combine machine learning-based textual analysis with social network analysis to examine the structure and content

of discussion networks in Twitter-like Weibo that revolve around the political aspect of food safety issues. The following research questions are addressed: How concentrated, reciprocal, and inclusive is the discussion network on Weibo? Is emotion typically reciprocated, and are users expressing the same type of negative emotions more likely to form conversational ties than users with different emotions? Does the status of discussants—which is based on their issue involvement, follower count and verification status—affect the influence of their talk? Based upon an analysis of 43,575 Weibo posts, we find that the Weibo space does not constitute Habermasian deliberative public sphere because emotional rather than rational-consensual discussions prevail, and the like-minded tend to cluster. Further statistical analyses of a hand-coded sample show that emotional discussions influence people more than cognitive discussions (with distinct emotions—such as anger, fear and sadness—having different effects), and the status of discussants still matters. We contend that this kind of online civic talk underlines an expressive form of rationality that transcends the dominant bipolar instrumental communicative dimension for understanding the use of SNS (social networking sites) in online political discussion.

Using Trusses to Detect Social Anomalies in Network Data

Christine Sowa (Johns Hopkins University Applied Physics Lab), Janis Butkevics (Johns Hopkins University Applied Physics Lab), Jonathan Cohen (Johns Hopkins University Applied Physics Lab)

This study looks at communication networks within a large ($N > 4000$) cohort. In order to analyze multiple longitudinal networks in a computationally feasible time, the truss subgraph detection method is utilized to identify similarly-connected individuals. It examines the emergence and evolution of social cliques in real time using the trusses algorithm. By following changes in these subgraphs, social phenomenon is observed and explained. This presentation describes how certain new connections are more critical than others as they either strengthen a subgroup to include more members or dissolve it completely. Techniques to identify such important nodes are discussed and applied to the data set.

What Predicts the Dissolution of Instructional Advice and Information Ties Between Teachers?

James P. Spillane (Northwestern University), Matthew Shirrell (Northwestern University)

A significant body of research has focused on the factors that predict the formation of instructional advice and information ties between school staff, but less attention has been paid to the dissolution of previously existing ties. Tie dissolution between teachers could be seen as either negative or positive, either impeding or promoting the development of social capital—and instructional improvement—within schools. Using four years of social network data from a mid-sized U.S. school district, this paper examines the dissolution of both teachers' close colleague ties and their advice/information ties in mathematics and reading. We first present descriptive analyses of the dissolution of both close colleague and advice and information ties over a four period. We find a great deal of dissolution of ties between years, with close colleague ties generally more persistent than instructional advice/information ties. We then use an HLSM model (Sweet, Thomas, & Junker, 2013) to examine the predictors of the dissolution of ties between teachers. In particular, we examine whether aspects of the formal school organization (such as grade-level assignment or holding a leadership role) predict tie dissolution, or whether individual characteristics (including teacher-teacher trust and perceptions of colleagues' effectiveness) predict the dissolution of ties. Findings from this study will enable schools and districts to understand the factors that drive the dissolution of ties between teachers.

Mechanisms of Tie Formation in Activity-based Online Social Networks

Emma Spiro (University of Washington), Zack Almquist (University of Minnesota)

Understanding network-based social contagion is an area of long-standing interest in the social sciences. Recently, increasing attention has been paid to promoting certain habits through social interaction in activity-based online communities. However, before network-based health interventions can be designed and executed in this context, researchers must understand how personal network structures in these communities are formed, as well as the social processes that structure relationship construction and maintenance. Here we use data from the online activity-tracking and social network platform Strava to explore tie formation across a period of multiple years. We evaluate the extent to which preferential attachment mechanisms match empirical network dynamics over time. In addition, we compare

these mechanisms of tie formation by gender. Preliminary results indicate personal network structures differ by gender in this environment, suggesting different mechanisms of tie formation. These results have important consequences for network-based peer influence.

Analyzing Public Health Community Networks Using PARTNER to Assess Early Childhood Councils

Sara Sprong (University of Colorado Denver, School of Public Affairs), Jessica Retrum (Metropolitan State University of Denver), Danielle Varda (University of Colorado Denver, School of Public Affairs)

Background: Mobilizing partners to accomplish systems level goals is a stated public health service, however processes to ensure successful outcomes are difficult to identify. In this session we will present the results of statewide Quality Improvement (QI) process that focused on improving systems building networks among twelve Early Childhood Councils (ECCs) (N=12) across the state of Colorado. Using a social network analysis approach, researchers set out to determine whether evidence-based QI strategies lead to early childhood systems changes and process improvements within these communities.

Methods: A combination of initiatives to build Colorado's capacity to deliver early childhood interventions spotlighted the need for developing the workforce's skills in assessing and managing partnerships and thereby strengthening the early childhood system. Through the support of multiple funders and initiatives, local early childhood councils around the state engaged in an evaluation and capacity-building effort of their partnership activities. A validated tool (PARTNERtool.net) for collecting, analyzing and interpreting data to improve networks was administered to 12 early childhood community networks. The QI methodology included: stakeholder meetings to identify ideal networks in each community, administration of the PARTNER social network survey to over 700 stakeholders, and QI training that included the development of action steps for each ECC.

Results: Data from the SNA tool showed variation across sites, requiring tailored capacity building and quality improvement activities. Impact of early childhood interventions were demonstrated as various measures of "systems outcomes". These outcome measures demonstrate a viable and necessary role for early childhood interventions, providing some of the only quantitative measures on partnership of the interventions to date.

Discussion: Participation by stakeholders increased ECC knowledge of a systems building specific QI tool. All of the participants participated in designing their QI process, developing action plans that ranged from involvement of different/more stakeholders, to process recommendations for building trust and leveraging the value that partners bring, to more complicated recommendations of governance change and network restructuring.

Implications: Partnerships are essential to improving public health and reducing disparities and funders often require them. Using a research-based approach, such as SNA, allows us to build workforce capacity to manage and build these partnerships and increase their effectiveness as demonstrated in these early childhood systems projects. In addition, evidence of their impact can be communicated to policymakers, stakeholders, and funders, a necessary component for continued legislative and funding support.

A dynamic model for networks of bilateral coordination

Christoph Stadtfeld (ETH Zurich), James Hollway (Graduate Institute Geneva), Per Block (ETH Zurich)

Networks of bilateral coordination are a common phenomenon that is widely studied in the social sciences. Three examples of networks of bilateral coordination are countries signing bilateral agreements, organizations deciding to jointly invest resources, and people forming romantic relationships or deciding to get married. In networks of bilateral collaboration, various actors simultaneously seek out for potential partner. Only when two actors agree that they want to establish a tie, an undirected network tie comes about.

In this talk, we introduce a new statistical model for the analysis of dynamic networks of bilateral coordination. It builds upon stochastic actor-oriented models (SAOMs, Snijders et al. (2010)) and models for time-stamped network data (Butts (2008), Stadtfeld (2012)). The model allows to study the preferences of actors who are seeking out for potential partners and, in particular, under which circumstances partners eventually agree on the formation of a tie of bilateral coordination. Typically, the model is applied in the empirical study of time-stamped, undirected network data. One of the core strengths of the model is that it can be specified in a very flexible way. It allows to

test hypotheses about the influence of other actors' decisions, about the role of dynamically changing covariates on an actor-, tie- and global process-level, about the effect of recent network changes and about the conditions under which multiple ties are formed.

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Opioid and Benzodiazepine Prescribing among Medicaid-enrollees with Opioid Use Disorders: The Role of Provider Communities

Brad Stein (RAND Corporation), Joshua Mendelsohn (RAND Corporation), Adam Gordon (University of Pittsburgh), Andrew Dick (RAND Corporation), Rachel Burns (RAND Corporation), Mark Sorbero (RAND Corporation), Rosalie Pacula (RAND Corporation)

Opioid and benzodiazepine use in individuals with opioid use disorders (OUD) can increase the risk for relapse, and yet, a substantial portion of Medicare-enrollees with OUD receive prescriptions for them. Using Medicare billing records for enrollees in 12 states, we explore how the chances of receiving such a prescription relate to the network community structure of treatment. We find that physicians cluster together into groups that tend to treat the same sub-population of patients – communities of practice. Patients with an OUD who receive treatment from physicians in many different communities were statistically more likely to receive an opioid and/or benzodiazepine prescription, even when controlling for the number of physicians seen. Patients with an OUD who received treatment from communities with higher patient/provider ratios were also statistically more likely. Both patterns suggest that interventions targeted to provider communities may be effective at reducing the risks of relapse among patients with opioid use disorders.

Longitudinal Network Analysis with Incomplete Data

Zachary Steinert-Threlkeld (UCSD)

Political scientists lack a low-cost methodology for analyzing structural properties of large scale networks. This paper shows how to analyze individuals' changing structural position at a daily level, using the social network Twitter. To do so, two innovations are introduced. First, one can infer when two individuals connect with other an arbitrary amount of time after they actually connected, a task made difficult by how Twitter delivers data to researchers. Communities which connect individuals from different countries can also be identified with this first method. Observing daily network change reveals changing communities and individuals' position therein. Second, a network measure from computer science, neighbor cumulative indegree centrality (NCC), is introduced; it preserves the rank ordering of individuals' centrality without the complete network data that those measures require. Combining the first method with the second creates daily data on network centrality. Moreover, these methods can be applied to a network after the period under study has past. Without these methods, daily data on the structural position of individuals would be prohibitively costly to obtain. These methods are demonstrated with 21 Twitter accounts from Bahrain and Egypt during a 3 month period in early 2011. Ground truth data on their number of followers confirms the accuracy of the post hoc inference, the activists' network centrality changes, both absolutely and relative to each other, and individuals who link activists in each country are identified.

A Social Network Perspective on the Influence of Social Context on Supervisor Perceptions of Counterproductive Behavior

Christopher Sterling (California State University, Fresno), Travis Grosser (University of Connecticut)

Supervisors frequently monitor the behavior of their employees and form judgments that serve as the basis for employee evaluations. Supervisor ratings of performance have been the object of countless organizational studies. Much of this

research has focused specifically on how supervisors evaluate task related performance and organizational citizenship behaviors (Levy & Williams, 2004). Counterproductive behavior, voluntary behavior that harms the organization or organizational members (Robinson & Bennett, 1995) is an increasing concern in organizations. Some researchers have suggested that counterproductive behavior should be considered an additional component of overall job performance (Rotundo & Sackett, 2002) because of the strong correlation between these two constructs and the immense cost that workplace deviance poses to organizations. Despite the growing importance of understanding counterproductive behavior, relatively little is known about the process by which supervisors evaluate the counterproductive behavior of their employees. Research focused on understanding performance appraisals suggests that supervisor evaluations are primarily subjective and greatly impacted by social context (Levy & Williams, 2004). Appraisals of counterproductive behavior may be even more influenced by social context because of its anti-normative nature. We argue that because of the covert and insidious nature of counterproductive behavior, supervisors may lack the behavioral cues needed to form an objective judgment and will seek out more transparent and stable cues from the social environment, namely the position of employees and supervisors in positive and negative tie networks.

We test three separate relational mechanisms by which supervisor perceptions of counterproductive behavior can be influenced. A social perception mechanism (Podolny, 2001) involves the substitution of discrete behaviors for more stable relational patterns. According to this perspective, positive tie and negative tie centrality of employees serve as social signals influencing attributions that supervisors make toward employee behavior. A social proximity mechanism involves the ability of the supervisor to monitor employee behavior. When supervisors are closely connected to misbehaving employees they should have more opportunity to directly observe instances of bad behavior (Brass, Butterfield & Skaggs, 1998). A social contagion mechanism suggests that supervisor attitudes are directly influenced by third party ties. Because misbehavior is often difficult to directly observe supervisors will form attributions based on the attitudes that others have toward the employee in question (Borgatti & Foster, 2003).

Results suggest that both positive and negative ties serve as strong signals to supervisors, indicating how employees likely interact with their peers. Negative ties have a stronger impact on supervisor ratings of deviance although having a large number of positive ties partly attenuates the positive relationship between negative ties and supervisor ratings of deviance. Furthermore, being friends with a supervisor significantly moderated the relationship between negative ties and supervisor ratings of counterproductive behavior, suggesting that social proximity better enables supervisors to cue on the negative ties of their employees. Finally third party negative ties had a significant effect, when an employee has a negative tie to the positive tie of a supervisor they were more likely to receive higher supervisor ratings of counterproductive behavior.

Social influence models with missing data

Alex Stivala (The University of Melbourne), Colin Gallagher (The University of Melbourne), David Rolls (Dept. of Psychological Sciences, University of Melbourne), Peng Wang (Centre for Transformative Innovation, Swinburne University of Technology), Garry Robins (University of Melbourne)

The autologistic actor attribute model (ALAAM) is a statistical model based on the well-established exponential random graph model (ERGM) for social networks. ALAAMs can be used as a social influence model, predicting an actor's attribute based on his or her network ties, as well as attributes of the actor and his or her network partners. In this way an ALAAM is similar to logistic regression, but, unlike logistic regression or similar statistical techniques, it specifically does not assume independence of the predicted attributes: an actor's attribute may depend also on those of its neighbors in the network.

Using simulation studies, we investigate the effect of using simple random samples and snowball samples of network data on ALAAM parameter inference. We examine both fixed choice sampling designs (in which an actor nominates up to a fixed maximum number of network partners), and designs with no such limit (all network partners are assumed to be named).

One practical motivation for this study is the manner in which social influence models may be applied to epidemiological studies of health outcomes in community samples when the entire community network is simply not available. These studies often use cross-sectional data to examine the prevalence of health conditions. Outcomes are often binary, representing probable diagnosis, and so logistic regression is used. However, an important question in these studies is that of interdependence of outcomes and the potential spread or co-occurrence of such outcomes across network ties.

We examine Type I and Type II error rates, and find that parameter inference works well even with a large fraction of missing nodes. For a given network sample size, obtaining the sample by snowball sampling results in higher power on certain parameters than simple random sampling. These results give confidence that ALAAM parameter inference can be used on sampled network data, even when the sample only covers a relatively small proportion of the entire network.

To share or not to share? A social network application of transactive memory theory to examine knowledge sharing and hiding in organizational work teams

Chunke Su (University of Texas at Arlington), Kami Vinton (University of Texas at Arlington)

In the current knowledge economy, knowledge sharing is considered to be almost sacrosanct, especially in organizational work teams. However, side by side with the increasing sharing of work-related knowledge in today's workplaces is the pitfall of oversharing, which may adversely affect individual and team performance. In fact, organizational members in many instances tend to hide their knowledge from others even when organizational practices are designed to facilitate knowledge sharing. While there is an abundance of scholarship on organizational knowledge sharing, little research, especially social network studies, has been done to examine knowledge hiding in organizational settings. Therefore, the goal of this research is to fully understand why and how organizational work team members share and hide their knowledge from their coworkers.

To achieve this goal, this research employs a social network approach to extend and integrate transactive memory theory and related knowledge management research to examine the factors that influence the emergence of team members' knowledge sharing and hiding networks. Specifically, these factors include: 1) the endogenous network factors, which refer to the structural properties inherent in team members' knowledge sharing and hiding networks such as the reciprocal, transitive, cyclical, and centralized structure of the networks; 2) the exogenous network factors, which refer to other co-existent interpersonal networks (e.g. trust, communication, task interdependency, perceived expertise, perceived competition, and interpersonal justice) as well as non-network personal attributes (e.g. personality, intrinsic motivation, goal orientation, organizational commitment, hierarchical status, and job characteristics); 3) the organizational factors, which refer to the macro-level characteristics of the work settings such as organizational culture, norms, and structure.

To test how the above factors influence team members' knowledge sharing and hiding networks, whole-network survey data are collected from two pre-existing work teams in a major metropolitan area in the Southern United States. Data are analyzed by ERGM (Exponential Random Graph Modeling) analysis to test the statistical likelihood for the hypothesized relationships to occur in the empirical data. The findings suggest that organizational team members' knowledge sharing and hiding networks are influenced by a multitude of network and non-network factors at the personal, interpersonal, and organizational levels. This research contributes to the theoretical development, methodological applications, and practical management of knowledge sharing and hiding in today's organizations.

Social Network Analysis of the FIFA 2014 World Cup: Quantification of Games Won by Germany

Keita Sugihara (NANZAN UNIVERSITY)

In a soccer game, players pass a ball to each other to score a goal. By entering the number of times player i passes the ball to player j into the (i, j) element of an adjacency matrix, we can analyze the game with social network analysis (SNA). In this presentation, we examine how the difference between a one-sided game and a close game can be quantified using SNA. The presenter will cite games from the FIFA 2014 World Cup, when Germany was the champion, as examples. The focus will be on four games in the second stage: Germany vs. Algeria (Round of 16), 2-1; France vs. Germany (Quarter-Finals), 0-1; Brazil vs. Germany (Semi-Finals), 1-7; and Germany vs. Argentina (Final), 1-0. First, the presenter will provide a brief account of each match, showing the following total passes and ball possession rates of each team: Germany vs. Algeria (Round of 16), 640-256, 63%-37%; France vs. Germany (Quarter-Finals), 336-357, 50%-50%; Brazil vs. Germany (Semi-Finals), 333-391, 52%-48%; and Germany vs. Argentina (Final), 600-323, 60%-40%. The pass numbers and ball possession rates suggest Germany was the dominant team in the games against Algeria (Round of 16) and Argentina (Final), and an even team in the games against France (Quarter-Finals) and Brazil (Semi-Finals). Second, the presenter will examine the boxplot of pass numbers from each player to each player of the two teams in each game and the boxplot of structural equivalence scores between each player, which

derive from the adjacency matrix of pass numbers. The presenter will compare the boxplots of Germany and those of the opponents, and discuss how the results are different between the games in which Germany is the dominant team (Round of 16 and Final) and the games in which Germany is the even team (Quarter-Finals and Semi-Finals). Third, the presenter will draw a pass network graph of each team in each match. In the graph, each node represents a player, and the distance between each node in the network corresponds to the structural equivalence distance between the players, which derive from the adjacency matrix of pass numbers. In the graph, the width of each arrow shows the number of passes from player i to player j . The presenter will compare the networks of Germany and those of the opponents, and discuss how the results are different between the games in which Germany is the dominant team (Round of 16 and Final) and the games in which Germany is the even team (Quarter-Finals and Semi-Finals). The presentation will conclude with a summary, suggesting how SNA is useful in quantifying soccer games.

Missed Connections? Social Similarity and the Diffusion of Smoking among Adolescents

Chan S. Suh (Cornell University), Yongren Shi (Cornell University), Matthew Brashears (University of South Carolina)

How does social similarity among adolescents shape behavioral diffusion? Previous studies in criminology have primarily focused on the effects of peer networks on delinquency, but less is known about the importance of social similarity. Similarity is typically regarded as a predictor of interpersonal relationship (i.e., homophily), but the independent effect of social similarity on behavior has been under-examined. In this paper, we explore the role of familiar others, namely those who share socio-demographically similar characteristics but do not form a friendship, in spreading delinquent behavior. We focus on the diffusion of smoking cigarettes and marijuana among adolescents, which is a publicly visible form of behavior. Using data from the National Longitudinal Study on Adolescent to Adult Health, our study shows that the behavior of familiar others has a significant and positive effect on one's frequency of smoking both cigarettes and marijuana, even after controlling for the behavior of friends. Moreover, the behavior of familiar others increase the likelihood of non-smoking adolescents in Wave I to learn smoking behavior in Wave II. The results have important implications for expanding our understanding on the social diffusion of adolescent behavior through non-network channel.

How do Environmental Groups “Flock Together?”: A Study of Homophily Effects on the Utah Environmental Network

Ye Sun (University of Utah), Kevin Deluca (University of Utah), Natasha Seegert (University of Utah)

Research Questions

Whereas homophily effects have been widely examined in a host variety of networks involving individual actors, few studies examined whether and how organizations that share similar profiles “flock together.” This study seeks to understand what shared organizational characteristics, if any, are associated with patterns of network communication among environmental organizations in Utah. Focusing on four organizational characteristics (agency type, issue focus, organizational goal, and approach), our study seeks to address two questions:

RQ1: What organizational characteristics are associated with the likelihood of an organization being more connected?

RQ2: What dimensions of homophily, if any, increase the likelihood of shared ties among the environmental organizations?

Methods

Using a complete list of Utah-based environmental organizations, we contacted the manager or director of each organization to participate in an online survey. 34 out of 85 organizations (40%) responded to the survey and provided data on the sociometric question of naming up to five other Utah-based organizations that they had communicated with in the past six months. A network of 50 nodes was obtained and analyzed. Two trained coders coded each organization on four characteristics: agency type (governmental vs. non-governmental), issue focus (water, energy, air, wilderness, sustainability, multi-issue), goal (education, administration, advocacy, mixed), and approach (lobbying, regulation enforcement, citizen projects, citizen direct action, mixed). Krippendorff alphas for these four variables ranged from .79 to 1. Exponential random graph model (ERGM) analyses were conducted in R. Node attributes

effects (“nodefactor”) and homophily effects (“nodematch”) were included in the models to address RQ1 and RQ2 respectively.

Results

In response to RQ1, organizational goals and approaches significantly influenced the likelihood of an organization being connected in the network. Organizations using direct action as the main strategy and those with multiple goals were more connected ($p < .05$). In answer to RQ2, governmental organizations were more likely to cluster with each other ($p = .000$) whereas there was no significant evidence of homophily effect for non-governmental organizations ($p = .134$). Organizations with the same issue foci were significantly more likely to have ties with each other (p ranging from .000 to .003 for each issue focus).

Conclusion

Our findings showed significant homophily effects for issue foci and agency type such that organizations with the same issue focus, and the governmental environmental organizations, were more likely to have ties with each other. Non-significant homophily effects were intriguing as well by showing that 1) non-governmental organizations were probably not just communicating with each other, but reaching out to governmental organizations as well; and 2) as alliances of environmental organizations in Utah were so far built mostly around shared issue foci, exploring how to strengthen network ties based on similar organizational goals and/or approaches may be a productive avenue for future research.

“Who Communicates with Whom”: Social Capital, Designer Performance and Network Formation in the Online Brand Community

Yao Sun (University of Southern California)

Taking one step forward from the notion of “who connects with whom”, this study examined “who communicates with whom” through observing the blog community on a crowdsourcing website for designing and selling T-shirts. Three networks of bloggers and commenters were analyzed, and the impacts of network structural attributes were tested. Results indicated that community members follow the logics of homophily, reciprocity, transitivity when communicate on blog forums, and greater social capital predicts better performances of bloggers. Implications for future research were discussed.

Modeling Social Networks as Mediators

Tracy Sweet (University of Maryland)

In the educational and social sciences, interventions sometimes aim to change the ways in which individuals interact as means to improve some other outcome. For example, educational professional development programs often focus on the ways in teachers communicate or consult with each other to ultimately improve teaching quality. In these studies, the social network within each school provides insight into the mechanisms that affect individual outcomes and acts as a power mediator between the intervention and outcome.

Consider a professional development program whose aim is to bring teachers together to communicate about instruction. Assuming the program is effective, the communication network of these teachers is now different than it was before. The social network therefore is the first observable outcome of the intervention. Of course, the ultimate goal is to improve instruction, so the social network actually operates as a mediator. Now that teachers have created these relationships (and/or changed existing relationships), these new networks can create a path through which teacher quality improves.

Sweet et al. (2013) and Sweet et al. (2014) introduced statistical network models for network-level interventions, building on a small literature on multilevel social network models. In their models, they introduce models for samples that accommodate treatment effects. These models naturally lend themselves to education research where networks of teachers (or students) exist within each school.

We introduce a Bayesian framework for modeling social networks as mediators; we combine statistical network models for network-level interventions with Bayesian mediation models (Yuan and MacKinnon, 2009). Instead of a mediating variable, we develop models where the social network is the mediator. As a proof of concept, we introduce a mediation

model where the mediator is a hierarchical mixed membership stochastic blockmodel. Thus, the intervention affects the shape of the networks and the shape of the networks affects a node-level variable (e.g. teacher instruction).

Centrality in the Global Network of Corporate Control

Frank Takes (University of Amsterdam), Eelke Heemskerk (University of Amsterdam)

We explore the concept of centrality within the global board interlock network. In this network, close to 400,000 nodes represent large firms across the globe, and over 1,700,000 edges represent board interlocks based on shared senior level directors at these firms. The work results in three contributions to both the study of large-scale corporate networks as well as the general field of network science and the interpretation of centrality measures.

First, to the best of our knowledge for the first time we can investigate the concept of centrality in corporate networks at a global scale, allowing for a cross-country comparison. We demonstrate, amongst other things, large differences between countries when it comes to the relation between economic prominence indicators such as revenue and different firm centrality measures. Overall, betweenness centrality appears to give the most consistent results, positively correlating with firm prominence in both the global network as well as most national networks.

Next, we use network topology and centrality to better understand the embeddedness of different countries within the global network. In previous work we have shown how community detection revealed the footprints of national networks within the global network. This work provides additional evidence for this based on two observations in the topology of the different national networks and the global network. We observe how on average, the 35 largest national networks are more tightly connected (based on the average node-to-node distance) than the global network itself. Then, we apply a new measure of centrality persistence that is able to measure the persistence of the centrality ranking of a particular partition of a network within the full network. For our board interlock network, we find that for most countries, the economic order of firms is quite well preserved when comparing the national and the global scale. We furthermore introduce the concept of partition ranking dominance, which tells us whether a partition (country) is more dominant in the top or the bottom of the centrality ranking of the full (global) network.

Finally, comparing our two new measures between different countries allows us to classify countries based the relation between the centrality of a country's firms on the national and the global scale of the board interlock network. For example, we find that countries with a high GDP are better at preserving their firm's central positions within the global corporate network than countries with a lower GDP. Furthermore, we are able to characterize countries with clear outward and inward oriented economies. Together, the two newly introduced measures give a quantification of the extent to which a country's firms are at a central position at both a national and a global scale, providing new evidence for assessing the power and control of a country's firms at different scales of the global board interlock network.

How Social Networks Shape Absorptive Capacity in Open Innovation: Preliminary Results from Two Case Studies

Andrew Terhorst (CSIRO)

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is running a project that explores how social networks affect absorptive capacity in open innovation. Open innovation is a distributed innovation process based on purposively managed knowledge flows to accelerate internal innovation and expand markets for external use of innovation. A major project goal is to gain insight into personal and organisational factors influencing boundary-spanning knowledge sharing, idea generation, idea realisation, and trust networks, and how these different networks relate to each other. A secondary project goal is to discover how tacit knowledge and power relationships influence intra- and inter-organisational learning processes that underpin absorptive capacity. A network perspective of open innovation that focuses on the social mechanisms of absorptive capacity operating at different levels should contribute to more effective management of knowledge flows in open innovation.

Firms are under increasing pressure to continuously innovate to maintain or enhance their competitive advantage. Technological advances are driving the proliferation of increasingly complex knowledge and firms can no longer solely rely on their internal knowledge assets for innovation. A growing number of firms are embracing open innovation as a strategy to remain or become more competitive. Some firms are better than others in capturing value from open innovation due to their ability to acquire, transform and exploit new knowledge for commercial purposes - an ability

known as absorptive capacity. One may view absorptive capacity as a specific example of organisational learning concerning a firm's relationship with new external knowledge. The social mechanisms through which firms acquire and use external knowledge to innovate remain under-investigated. Looking at absorptive capacity through the lens of social network analysis may provide insight into critical firm-based factors that develop it.

This project uses mixed-method social network analysis to scrutinise the structure and content of boundary-spanning social networks in three open innovation case studies drawn from the agricultural and food-processing industry. These industries must become increasingly innovative to deal with expanding markets and increased competition arising from the implementation of multilateral free-trade agreements. The mixed-method social network analysis will examine different patterns of connection across the open innovation collaboration as a whole, and semi-structured interviews to assess the nature of communication between selected individuals in central positions or at the fringes of networks.

Patterns of brokerage, network closure and reciprocity are examined using a multi-theoretical analytical framework that allows simultaneous assessment of social mechanisms operating at the individual, relational, group and organisational levels. The semi-structured interviews explore how patterns of connection are shaped by industry and organisational factors and what this means in terms of intra- and inter-organisational learning and level of collaboration. Preliminary results from two case studies, one addressing cold chain innovation, the other looking at robotic milking systems, are presented.

Social Network Analysis in Low-resource Settings: Data collection do's and don'ts

Anja Thompson (PATH)

The aims of this presentation are to share how social network analysis can be used in low-resource settings and to discuss barriers to overcome in collecting data. In May 2015, a team from PATH conducted a workshop in Tanzania to map the linkages between organizations involved in the public health supply chain. Participants ranged from central, regional, district, and local levels. The workshop was an opportunity to hear from all levels of the supply chain sector and understand specific bottlenecks when a new health technology is introduced into the country. Social network analysis was an interesting tool to use in this type of environment, but challenges arose in the data collection process. The first challenge was understanding the cultural context of the audience in the room. Some in-country participants were hesitant about the wording of the questions. The team had to be very intentional with the use of the word 'trust,' when asking the participants to rate their colleagues based on trust or confidence. PATH has conducted social network analysis surveys in other countries throughout Africa, and the word 'trust' was generally accepted. The data collection was conducted in a group workshop setting. This setting had its advantages along with some disadvantages. The data collection strategy is more time and cost-effective than one-on-one interviews, however the challenge was to ensure that valid and reliable data were collected, while also enabling participants to feel comfortable sharing their perceptions of system challenges. The team overcame this barrier by keeping participants' names anonymous and only naming their organizations (organizational network analysis). The team used a relatively general name generator to ensure a wide range of stakeholders were identified through the survey; however, this led to a large number of alters identified throughout the country, making it infeasible to follow up with all of them. This approach added several supply chain players that could not have been identified otherwise, but made the data set very broad. Along with the design of the tool, it is important to think about data management post-workshop and decide early on if paper-based, excel-based, or web-based surveys are the most appropriate and efficient for a low-resource context. The team decided on paper-based surveys; however, excel-based surveys may have been feasible and more efficient. Collecting social network analysis data on a small budget in low-resource settings is challenging, so it is important to remain flexible and continually update tools as needed. Social network analysis can be a powerful tool when working with governments in low-resource settings. Taking the necessary preparations when entering a low-resource setting can greatly overcome some barriers in the data collection phase and ultimately provide you with better data to analyze.

A networked anatomy of the CDO bubble

Daniel Tischer (University of Manchester), Adam Leaver (University of Manchester)

This paper provides an analysis of the emerging CDO market prior to 2008 using a network approach. Previous discussions of the crisis within the context of "bubble" have often, and correctly, focused on demand issues, in particular referencing "manic" or "irrationally exuberant" behaviour of traders and investors. Responding to this, our

network analysis seeks to advance a supply-side explanation of CDO bubble by exploring the changes in the structural and relational characteristics of this emerging market leading up to the bursting of the bubble in late 2008.

Network analysis, both as method and theory, is increasingly employed to explore the interconnectedness of markets, for example to model intersecting ownership of assets, risk concentration and financial flows between financial intermediaries, underlining the potential for network analysis tools to advance our understanding of market activities.

Our analysis is based on data of 372 CDOs issued between 2001 and 2007 and connections are based on actors' involvement in structuring CDOs. The analysis features both longitudinal and static types of analyses.

Findings highlight a surge in the number of suppliers after 2004, not only fuelling demand, but also creating a more complex, less transparent network of actors seeking to benefit from the boom in CDOs. At the same time, firms that entered the market early appear to retain their position at the core of the network leading to a concentration of risks. Overall, we argue that this type of tiered-network enables specific norms and cultures to be spread throughout the network fast, leading to a quick adoption by new entrants via "copied behaviour" and thus ultimately fuelling market bubbles.

Students' popularity, achievement and school assessment

Vera Titkova (National Research University Higher School of Economics – St. Petersburg), Valeria Ivaniushina (Higher School of Economics), Daniel Alexandrov (Higher School of Economics - St.Petersburg)

In our paper we suggest that the relation between good grades and popularity is an indicator of school quality. The main argument is that in "good" schools peer-environment supports learning and learners, while in "troubled" school most children are disengaged from learning, and peers are negatively influencing learning activities. We operationalize this argument by measuring sociometric popularity in classes: in "good" schools high-achieving students are to be popular, while in "troubled" students with good grades would be marginalized and thus sanctioned by the peers. We also expect to see gender differences in peer effects.

Data has been collected in school survey in St. Petersburg, Russia: total sample of 7300 students from 8th, 9th and 10th grades; the age of students ranged from 14 to 16 years (104 schools, 419 classes). For the purpose of network analysis we selected only classes where at least 75% students were present at the time of the survey to guarantee unbiased estimates for popularity. Therefore, final data set included 5058 students (270 classes, 98 schools). We define academic context as class-level or school-level aggregated characteristics of academic motivation: study involvement scale has been used for evaluating motivation on individual level and then aggregated on the group (class or school) level. Hierarchical multilevel regression (HLM 7 software) for analysis of the group effects.

We confirmed that relation between popularity and achievement depends on group academic motivation. For girls good grades are positively related to popularity in all classes/schools, regardless of group academic attitudes. For boys the relation between grades and popularity depends on academic context: in classes with high level of academic motivation boys who have better grades are more popular, while in classes with low level of academic motivation good grades are negatively related to popularity. We have also found that class context is more important than school context, and that schools with advanced curriculum (gymnasiums) do not necessary have higher level of academic motivation than schools with standard curriculum. Our study shows that how SNA methods (studies of peer popularity) can be used as a tool for school assessment and improvement.

We currently carry out qualitative research with interviews in schools in order to connect our results from quantitative data on popularity to contextual meaning and gendered notions of success as well as the relation between adolescent visions of masculinity/femininity, learning, and academic achievement.

Applied and Research Applications of Social Network Analysis with Religious Congregations

Nathan Todd (University of Illinois Urbana-Champaign)

This presentation reports findings from a research consultation with a religious congregation where I used whole social network analysis. The goal of the consultation was to collect and then disseminate social network data back to the congregation to help inform congregational decision-making. From a research perspective, these data provide a unique window into the social processes and patterns of friendship and spiritual support within a congregation. Indeed, scholars have called for an examination of the social aspect of religious participation to better understand

the form and function of relationships within religious congregations. From an applied perspective, this project shows how social network types of data may be useful to members of a religious organization. Guided by these research questions and applied goals, I collected demographic information, scales to assess sense of community, and whole social network data from 50 members of a small (weekly attendance was around 85) religious congregation. Multiple relations were gathered to assess friendship and spiritual support connections. I then used whole social network analysis where I (a) created pictures of the social networks, (b) integrated demographic information such as age and gender in the pictures, and (c) incorporated other information into the pictures such as attendance at other congregational activities and a sense of community. After a process of consulting with congregational leaders, these pictures were shared with the congregation. For research purposes, I examined additional network models to understand the structure of relationships, roles and positions, and how demographic characteristics such as political affiliation conditioned friendship and spiritual support connections. This presentation reports on the unique challenges of collecting social network data with a congregation and how the network information was useful (or not) to the congregation. Network pictures along with other general results also will be presented. Overall, the presentation provides an example of using network analysis with a religious congregation and the potential benefits to religious research by employing social network analytic methods.

How do firms' networks affect their participation in business seminars and subsequent behaviors? Evidence from a randomized controlled trial in Vietnam

Yasuyuki Todo (Waseda University), Yuri Kim (The University of Tokyo), Daichi Shimamoto (Waseda University)

This paper examines effects of firms' networks on their decision to participate in business seminars for export promotion and further on their actual behaviors for export activities. Our analysis is based on data collected by the authors from the population of approximately 300 registered firms (mostly micro, small, and medium enterprises) in 16 less developed garment clusters in Vietnam. Our data have two unique features. First, we performed a randomized controlled trial (RCT) in which we invited randomly selected firms to one-day business seminars for export promotion. Second, we conducted face-to-face interviews to the firms before and after the seminars and constructed the whole networks for each cluster based on a question which firms they exchange business information with at the director level. Using the data, we test two contrasting hypotheses on how network structure affects firms' decision to participate in the seminars. On the one hand, when a firm is invited to the seminar and its information exchange partners are also invited, the firm may be less willing to participate because the knowledge provided in the seminar could be obtained from its network partners later. This is an example of strategic substitution in network games. On the other hand, the firm may be more willing to participate in the seminar together with the partners because then the psychological cost of participation would be lower (i.e., participating with friends is fun) and benefits from participation would be higher (i.e., participants can confirm knowledge when friends also participate). In addition, we test how new knowledge for export promotion obtained in the seminar and behaviors stimulated by the knowledge (e.g., visiting websites of trade fairs) diffuse through firms' networks. Here, we also test two contrasting hypotheses: The knowledge and behaviors could diffuse easily to non-participants linked to participants or could diffuse to non-participants only when they are linked to the sufficient number of participants, as argued in Centola (2011, Science). The examination of the two sets of hypotheses provides us new insights on diffusion of knowledge and behaviors through social networks in the following two aspects. First, estimates of the effect of social networks on knowledge diffusion are often biased because of endogeneity of networks. However, because we performed an RCT so that the share of the invited among network partners of each invited firm is randomly determined, we can avoid the bias. Second, many existing social network studies have considered to which particular nodes (individuals/firms) new knowledge should be provided for efficient dissemination of knowledge. However, providing new knowledge to particular nodes by policies may not be successful because they may be unwilling to learn the knowledge. Therefore, distinguishing between targeting nodes for knowledge dissemination, their learning of the knowledge, and adoption of behaviors based on the knowledge, as is done in this study, will provide more practical policy implications.

Explaining participation in open organizations: The role of specialization and repeated collaboration

Marco Tonellato (Grenoble Ecole de Management), Guido Conaldi (University of Greenwich)

The viability of open organizations depends critically on their ability to attract and retain voluntary participants. This study shifts attention from the principal focus of existing research, on ex-ante motivations of these voluntary

participants, to examine the nature of their contributions and the network of their work relationships over time. We suggest that participant retention is critically impacted by the social and relational dynamics of open organizations through the progressive socialization and legitimation of participants in the course of their work. Individuals construct their profiles as specialists or generalists by narrowly focusing or widely dispersing their efforts across knowledge domains. We argue that a more narrowly focused expertise is beneficial to contributors as they develop economies of specialization and they signal their skills more easily, aiding integration and fostering sustained participation. However, we propose a moderating mechanism inherent in the collaborative nature of open organizations, whereby the beneficial effect of a specialist profile is diminished as contributors engage and re-engage in collaborative practices. This allows the emergence of collaborative “renaissance men” who can span many knowledge boundaries without damaging their standing within the community, on which their continued participation relies. We test our hypotheses using data on problem-solving in the form of source code contributions to the Apache HTTP Server repository. We examine the duration of the participation and the network of work relationships of 82 individuals who contribute 1425 commits, involving 10757 files over the time period 1996-2013. The results support our arguments and shed light on contingent factors influencing the likelihood of staying in the project of those with specialist versus generalist identity profiles. This work extends the current view by arguing that participants in professional settings form networks with their peers by means of their work activities. Instances of collaboration create the necessary conditions for organizational participants to span knowledge boundaries and be successfully integrated in the project.

Migration and Ethnic Segregation: Evidence from Mobile Phone Logs

Ott Toomet (University of Washington), Joshua Blumenstock (University of Washington)

How does migration impact ethnic segregation? Ethnic segregation is a prominent feature of most contemporary societies, and has been linked to patterns of economic development and growth, as well as to broader patterns of inequality, prejudice, violence, and discrimination. Segregation is also intimately connected to processes of migration, and to the manner in which migrants integrate into new communities. Migrants often choose to migrate to areas where their networks are stronger (Munshi 2003), existing residents often strive to keep out dissimilar immigrants (Schelling 1971), and political and institutional forces often prevent integration of migrants across ethnic lines (cf. Yinger 1986, Clark 1986).

We model and estimate the relationship between migration and segregation in Estonia, a small country with deep ethnic rifts. Our analysis leverages a unique dataset that captures detailed patterns of migration and segregation of tens of thousands of individuals. From the country's largest mobile phone operator, we obtained anonymized mobile phone transaction records, which make it possible to observe each subscriber's ethnicity, the complete social network of his or her mobile phone contacts (and their corresponding ethnicities), as well as all locations inhabited by the subscriber over a period of several years. Empirically, we are thus able to estimate the geographic segregation of each individual's place of residence, the social segregation of each individual's social (phone call) network, as well as any migrations the individual made within Estonia.

This paper makes three primary contributions. First, we provide novel empirical evidence on the relationship between geographic segregation and social segregation. In particular, we document a strong correlation between the ethnic composition of an individual's physical surroundings and the ethnic composition of his or her social network. This effect is attenuated among migrants, who are more likely to interact with co-ethnics, but who are less influenced by their immediate physical surroundings. These aggregate results suggest that intra-national migration may indeed help shape patterns of ethnic segregation.

Second, we develop a structural economic model to interpret the empirical results. Building on recent micro-economic models of network formation (cf. Currarini, Jackson, and Pin 2009), we assume that individuals meet randomly and decide whether or not to become friends based on the expected utility gained from the new social tie. Utility is decreasing in both the geographic and ethnic distance between individuals, that there are diminishing marginal returns to additional friendships, and that individuals incur an opportunity cost for each maintained friendship: $U_i = (\sum_j \exp(-\beta_e d_{eij} - \beta_g d_{gij} - \beta_x d_{xij}))^\alpha - cN_i$ where d_{eij} represents the ethnic distance between i and j , d_{gij} is the geographic distance, and d_{xij} is a random effect representing unobserved distance. We estimate the model by simulated likelihood. The results suggest that both ethnic and geographic distance weight prominently in the tie formation, and that being of the same ethnicity is roughly equivalent to a 10-fold reduction in physical distance.

Finally, we use the model to simulate various counterfactual settlement patterns.

When Do Relations between Organizations Serve Client Benefit? The Role of Enabling Network Structures

Denis Trapido (University of Washington), Francesca Pallotti (University of Greenwich)

The vibrant research on the outcomes of interorganizational relations has rarely attended to the outcomes of these relations for organizations' clients. We lack good understanding of how interorganizational networks serve the benefits of the clients, particularly when organizational outcomes are causally decoupled from the clients' outcomes. We examine two relational factors that lower barriers to knowledge sharing and thereby help clients benefit from providers' network relations. Building on insights from social comparison theory, we argue that organizations are more likely to know their partners' complementary capabilities and employ these complementarities to the benefit of the clients when they and their partners are incommensurate on visible performance metrics. We further argue that preferential transaction with a limited set of partners has the same beneficial effect on client outcomes. An analysis of a regional network of patient transfers among 110 hospitals supported these arguments.

Results from the RAND Social Context of Adolescent Risk Behaviors Study: Summarizing Key Findings

Joan Tucker (RAND Corporation)

I will serve as the Discussant for the panel "Beyond Middle School: Further Results from the RAND Social Context of Adolescent Risk Behaviors Study." In this role, I will be discussing the results presented in the previous talks in the context of the entire set of research findings from this project and the larger literature on social networks and adolescent risk behavior.

Women2Women Belgium 2015: Using Social Media and Social Network Analysis to Empower Young Women in the age of ISIS

Rusty Tunnard (The Fletcher School, Tufts University), Alysha Tierney (The Fletcher School, Tufts University), Katherine Trujillo (The Fletcher School, Tufts University)

Every year since 2006, Empower Peace, a Boston-based NGO, has held a one-week conference called "Women2Women" whose goal is to build a network of young women aged 15-19 from around the globe with leadership potential, engage them in the issues that define their lives, and give them the tools to create action plans that they can implement domestically and trans-nationally.

In recent years, the conference has become increasingly focused on the use of social media to create leadership networks, due to the dramatic and widespread use of both text and image-based messaging. At the same time, social media has become the primary recruiting tool of ISIS and similar organizations. Nowhere have these campaigns had more impact than in the immigrant communities of western Europe, where young men and women in increasing numbers are falling prey to the slick and sophisticated messaging and imaging being employed to attract them.

In light of this, Empower Peace was asked to host a four-day W2W 'Leadership in Action' conference in Belgium in November, 2015. 61 Belgian women between the ages of 16 to 20 were recruited from diverse ethnic, religious, linguistic and regional backgrounds. Media specialists, religious leaders, and university professors facilitated workshops to equip delegates with key leadership skills. In addition, participants were encouraged to use their own social media skills to create issue-based campaigns using familiar apps like Facebook and Instagram as well as new approaches like crowdsourcing.

Before, during, and after the conference, a team of researchers from the Fletcher School at Tufts University surveyed participants and tracked the growth and geography of social media networks and content, using social network software to present real-time visual and analytical feedback during the sessions and, post-conference, to help assess the effectiveness of the conference in creating lasting, issue-based networks, building bridges across ethnic and religious communities, and engaging young women in issues important to them.

This work will be presented and discussed by members of the Fletcher team, who will also be happy to discuss possibilities for further collaboration following on the success of the Belgian conference.

Modeling Human Behavior in Response to Natural Disasters

Yulia Tyshchuk (United States Military Academy/Rensselaer Polytechnic Institute)

Social media has become a significant medium for human interaction that delivers real time information to a vast number of people. This capability is especially useful during natural disasters. During the response to such events, social media can be used to facilitate emergency response by the creation, diffusion, and exchange of critical actionable information. Past research has addressed selected areas concerning the use of social media during these events such as the development of techniques that transform unstructured social media data into a structured format for ease of understanding. However, this research has not created new theories or utilized existing ones to explain human behavior on social media. This research examines how one such theory, Theory of Planned Behavior (TPB), can explain human behavior in response to natural disasters - as recorded by social media. Validation of this theory enables emergency response officials to create strategies that facilitate public response to natural disasters such as diffusion of critical actionable information, providing confirmations, and taking the prescribed action. Effective public response can save lives and reduce property damage. The research takes an empirical approach to evaluating TPB by postulating and testing that behavioral intent as expressed in social media is the best predictor of behavior and it is conditioned by attitudes, social norms, and perceived behavioral control. The methods utilized in this research include data analytics and survey methods. Data analytics include natural language processing, social network analysis, logistic regression, and structural equations modeling. Survey methods, including the use of Amazon Mechanical Turk, were used for internal validation of the theory. The research uses Twitter data in addition to publically available reports obtained during 2012 Hurricane Sandy to evaluate the components of the theory. The research developed methods that allow for the automatic measurement of Twitter users' behaviors, behavioral intents, attitudes, social norms, and perceived behavioral control using Twitter and publically available information. The methods were applied to the 2012 Hurricane Sandy. Results showed that the TPB provides an explanation for the diffusion of critical warning information on social media during natural disasters. The research found significant effects of social norms and perceived behavioral control on social media user's intent and behavior to diffuse critical warning information. Additionally, the effects of social norms demonstrated on Twitter were moderated by Twitter user's attitudes. Although, TPB has not been able to explain social media users' exchange of confirmations completely nor demonstrate evacuation behavior, the research has found that social norms established on social media play a significant role in facilitating these behaviors. The results of this research provide means for behavioral interventions to facilitate the diffusion of critical warning information on social media, diffusion of confirmations, and facilitation of the evacuation. Implications for other domains including military team operations and financial trading are discussed. The research provides theoretical foundations for the improvement of natural language processing techniques. The limitations of the findings and conclusions include specifics of the Twitter technology, the accuracy of natural language processing annotations, and survey response biases.

Modeling the dynamic of networks with heterogenous social capital allocation

Enrico Ubaldi (University of Parma), Nicola Perra (Greenwich University), Marton Karsai (ENS Lyon), Alessandro Vezzani (Parma University), Raffaella Burioni (Parma University), Alessandro Vespignani (Northeastern University)

The structure and dynamic of social network are largely determined by the heterogeneous interaction activity and social capital allocation of individuals. These features interplay in a non-trivial way in the formation of network and challenge a rigorous dynamical system theory of network evolution. Here we study seven real networks describing temporal human interactions in three different settings: scientific collaborations, Twitter mentions, and mobile phone calls. We find that the node's activity and social capital allocation can be described by two general functional forms that can be used to define a simple stochastic model for social network dynamic. This model allows the explicit asymptotic solution of the Master Equation describing the system dynamic, and provides the scaling laws characterizing the time evolution of the social network degree distribution and individual node's ego network. The analytical predictions reproduce with accuracy the empirical observations validating the theoretical approach. Our results provide a rigorous dynamical system framework that can be extended to include other features of networks' formation and to generate data driven predictions for the asymptotic behavior of large-scale social networks.

The Roles of Networks in SMEs' Internationalisation

Nuntana Udomkit (Business Administration Division, Mahidol University International College), Claus Schreier (School of Business, Lucerne University of Applied Sciences and Arts)

This research examines the roles of networks in helping SMEs to internationalise their business. A purposive sampling method was applied to 20 Thai small and medium sized enterprises (SMEs) that have been in operation for more than 5 years, and are engaged in internationalisation processes, including but not limited to, export, import, joint venture, or some forms of foreign direct investment. In-depth semi-structured interviews were conducted with the management of those SMEs between January and June of 2015.

This research finds that the key obstacles for SMEs internationalisation are lack of market insights, lack of knowledge and skills necessary for internationalisation, and lack of skilled labour. All SMEs in this research utilise networks to support their internationalisation. Networks provide knowledge and information relating to the internationalisation, including market information, work procedures, rules and regulation, and the referring of key contact persons who support internationalisation. In Thailand, personal networking has played the most prominent role in the early stage of SMEs internationalisation in the facilitation of relevant business and institutional networks. Trust is gradually built and reported to be the critical component for a long lasting relationship in the network. "Friendship" is viewed as the ultimate level of relationship in the trusted network.

Teaching and Learning About Networks: A Metacognitive Dilemma

Stephen Uzzo (New York Hall of Science), Catherine Cramer (New York Hall of Science), Lori Sheetz (Network Science Center, U.S. Military Academy, West Point), Hiroki Sayama (Binghamton University, State University of New York)

Networks as a cognitive frame for elucidating and deepening the understanding of complex and interconnected systems can be a powerful teaching tool. As computational approaches to network analysis and visualization become increasingly accessible throughout the instructional community, there are important opportunities to introduce these tools and techniques across the curriculum. But the primary challenge to bringing network ideas and techniques to educational practice is not professional development training, or additional time for developing learning progressions and curriculum for using the tools; it is not even knowing how to define networks, or see how they are used in practice. Rather, it is more likely a fundamental capacity for communities of instructional practice to understand how thinking about problems based on connectedness differs from thinking about problems from a reductive standpoint. The barrier for cultivating the capacity to understand seeking patterns and statistics in connected systems is how the network paradigm is fundamentally different from the structure and function of most education and pre-service learning experiences for teacher preparation. It requires an interdisciplinary perspective on problems and the ability to think systemically about them.

There is a clarion call for bringing these important perspectives into teaching and learning through recent changes in math and science standards. Network perspectives have applications in such cross-cutting and transdisciplinary concepts as modeling, statistics and probability; linear algebra, seeking patterns, systems and systems modeling, and cause and effect. In addition there are the demands on instruction for a higher level of sophistication of knowledge and approaches in instruction. Integrating graph theoretical approaches to a range of complex and interdisciplinary topics can greatly benefit teaching and learning practice, particularly in the humanities and health sciences. It is therefore very timely that we consider the impact of networks on instruction and develop practices and teacher preparation methods that leverage networks, along with ways to evaluate their effectiveness and generalizability beyond science and math.

In this presentation, the authors describe their experience in developing, applying and evaluating programs for teaching and learning about networks in secondary educational practice. In particular it will explicate the challenge of training teachers to integrate network approaches into instruction and develop interdisciplinary communities of practice that leverage network analytical skills. It will also describe of the role of the professional network practice community in informing and developing frameworks for teaching and learning.

How friends-of-friends referrals cause network inequality: Evidence from a field experiment

Mathijs de Vaan (UC Berkeley), Dan Wang (Columbia Business School)

We propose a new mechanism for the emergence of preferential attachment in social networks – what past work interprets as a mechanism that drives network inequality. Rather than assuming that preferential attachment results from an initial quality signal that the network centrality of an actor emits, we argue and show that preferential attachment may solely be produced through a simple mechanism: friends-of-friends referrals. After theoretically establishing the mechanism, we present a field experiment in which we intervene in the referral process.

The setting of the experiment is a series of professional conferences in which we observe the social networks of the attendees prior to and during each conference.

Although such conferences serve as an important arena for the forging of social capital in many professions, are the social mechanisms behind this process are also poorly understood. In our experimental design, each attendee is randomly assigned to one of two conditions. In one condition friend-of-friends are highly visible, whereas in the other condition friends-of-friends are obscured. The findings show that by diminishing the role of friends-of-friends referrals, the effect of preferential attachment on tie formation is also attenuated. We also supplement our results by analyzing rich data from 25 other conferences to show that the positive effect of an attendee's degree centrality prior to a conference on tie formation during the conference either diminishes or becomes statistically non-significant after accounting for the attendee's third-party (or Simmelian) pre-conference ties. Our results serve as the first large-scale quantitative treatment of understanding the relational antecedents to social network formation in diverse conference settings. Furthermore, our findings suggest that through a simple, low-cost intervention in varying exposure to potential social interaction, inequality in social capital may be reduced.

Using non-hierarchical multilevel models to analyze social support in overlapping egocentric networks

Raffaele Vacca (University of Florida), Jeanne-Marie Stacciarini (University of Florida), Mark Tranmer (University of Manchester)

This paper explores the application of non-hierarchical multilevel models, including cross-classified models and Multiple Membership Multiple Classification (MMMC) models, to the analysis of overlapping ego-networks. A common assumption in traditional multilevel analyses of ego-centered networks is that there is no (or negligible) overlap between networks - i.e., ego-networks from different egos have no alter in common, each alter belonging to one and only one ego-network. This assumption is needed to treat the data as a multilevel hierarchical structure with single membership, in which each level-1 unit (the alters or the ego-alter ties) nests into one and only one level-2 unit (the egos or the ego-networks). Although necessary to apply standard hierarchical multilevel models, the assumption of no overlap can be unrealistic for some real-world sampling designs. In particular, whenever egos are likely to know each other, for example in the case of snowball sampling or egos clustered within families, ego-networks can overlap to a considerable extent. Non-hierarchical multilevel models depart from the standard assumptions of hierarchical structure and single membership, and account for multiple non-nested classifications (e.g. pupils in cross-classified schools and residential areas) and multiple membership (e.g. one pupil attending multiple schools). This paper applies non-hierarchical multilevel models to egocentric data for the study of social support among Latino immigrants in America's rural new destinations. In a community-based participatory research among Latino immigrants in two rural counties of North Florida, we interviewed 89 Latinos from 30 households (30 mothers, 29 fathers, 30 adolescent children) and elicited a personal network of 20 alters from each. Our level-1 unit of analysis is the ego-alter tie, and the dependent variable is a measure of support - how supportive the tie is in a given dimension (financial, emotional, medical, and family support). We model support as a function of ego characteristics, alter characteristics, dyadic characteristics of ego and alter (e.g. ego-alter similarity), and characteristics of the whole ego-network. Ego-networks overlap in our data: 63% of the 1,780 ego-alter ties in the data involve "shared" alters that are nominated by multiple egos. These are 331 unique alters that are nominated on average by 3.4 egos. The overlap is only in part due to the egos being clustered within households. In fact, most overlapping of ego-networks occurs across different households, with 74% of the shared alters being nominated by egos in different households. This data can be modeled as a multilevel structure in which the level-1 units (the ego-alter ties) lie within two level-2 classifications - the ego classification and the alter classification. Neither classification is nested into the other, resulting in a non-hierarchical structure: Two ego-alter ties can belong to one ego and two different alters (whenever two alters are connected to the same ego), but they can also belong to one alter and two different egos (whenever two egos are connected to the same alter). We discuss the application of non-hierarchical multilevel models to this data and emphasize substantive findings about social support that could have not been obtained with traditional hierarchical models.

Network Influences on Country Policy Implementation

Thomas Valente (USC), Stephanie Dyal (University of Southern California), George Vega Yon (University of Southern California), Kar-Hai Chu (USC), Heather Wipfli (USC), Kayo Fujimoto (University of Texas at Houston)

Our prior research established a link between communication network exposure to country policy ratification of the Framework Convention for Tobacco Control (FCTC). We extend this study by now considering whether these networks were also associated with implementation of policy articles. In essence, we treat ratification as the first step in the adoption process followed by implementation. Results show that being well-connected (degree) in the GLOBALink communication network was associated with higher rates of treaty article implementation. We explore how various network indicators are associated with implementation of different treaty provisions. Our study has implications for how to model complex multiple outcomes over time.

A Network Evaluation Framework for Community Networks using the PARTNER Tool

Danielle Varda (University of Colorado Denver, School of Public Affairs)

Background. A major challenge facing community networks today is how to partner with other organizations, agencies, and groups to collaboratively address social and political goals while effectively maximizing resource sharing of the partners involved. However, the process by which organizations have engaged partners in collaboration has varied, with few ways to measure the success of these partnerships. Public leaders are eager to understand how to evaluate the collaboratives in which they are involved so that they may determine whether efforts to focus resources on partnership or collaborative development are working. Informed by research and evaluation of over 150 public health networks, the PARTNER (Program to Analyze Record and Track Networks) team has developed a community network evaluation framework, using the PARTNER tool. PARTNER (www.partnertool.net) is a social network analysis tool designed to measure and monitor collaboration among people/organizations. The framework includes four primary areas of measurement: Attribution, Perceptions, Agreement, and Interrelationships.

Methods: The evaluation framework is applied in a network evaluation of an interorganizational community network focused on early childhood development.

Results. Demonstration of the four dimensions are described through the case study. In summary:

Attribution: Many networks are facilitated and organized by a primary organization, sometimes called a Lead Organization, a Network Administrative Organization, or a Backbone organization. Others are governed by a group of organizations. Regardless, we often want to know how the growth and development of relationships in a network are started and fostered over time. The PARTNER tool (customized) can assess how the growth of relationships in a network are attributed to certain entities.

Perceptions: An important piece of information for any network leader to understand are the perceptions that members hold of one another, as well as perceptions of the network itself. The PARTNER survey collects data on both of these aspects. Specifically, we learn about the perceptions network members have of one another in terms of the value of the partnership (measured as power/influence, resource contribution, and time commitment) and trust (measured as mission congruence, reliability, and communication).

Agreement: The extent to which members of a network agree on the way the network is functioning is a key component to network leadership. Whether the members report that the network is or is not achieving its outcomes is as important as whether or not they agree on these assessments. The degree to which a network's members agree on these assessments is an indicator for a network leader of whether the network is functioning well or not.

Interrelationships: The actual relationships among members, including the intensity, quality, and content of the relationships tells us about the structure and strength of the network. The PARTNER survey uses standard social network methodology to assess the interrelationships of the network. We then assess how attribution, perception, and agreement correlate with the structure of the network.

Conclusion: These dimensions help understand the network, assess the strength of the network, and provide data to inform network leadership (the process of using data to think strategically about how to manage a network).

The future of the global kinship transition

Ashton Verdery (The Pennsylvania State University), Hannah Furnas (The Pennsylvania State University)

Kin play an important role in all societies and are some of the most important members of our social networks, constituting the majority of close confidantes in all cross-national surveys and strongly affecting life chances in a variety of domains. The existence and distribution of kin of different types is intrinsically linked to demographic patterns, and, consequently, we can study societal variation in expected kinship patterns. The world is in the midst of a broad kinship transition, stemming from long run population processes associated with the demographic transition. In this paper, we link recent developments in probabilistic population forecasting and simulation modeling of kinship systems to study how kinship will change in different countries throughout the world from now until 2100.

Bank centrality revisited: financial power in corporate elite networks

Antoine Vion (Aix-Marseille University), François-Xavier Dudouet (CNRS), Philippe Blanchard (Warwick University)

For quite some time, it has been clear that big companies interlocking directorates are the most developed in Europe. Many descriptions of this phenomenon have been edited (Heemskerk 2013; Dudouet et al. 2012). The aim of this paper is not to go on discussing the ways to provide the sharpest measures of transnational corporate networks (Burris & Staples 2012, Vion et al. 2015), but to renew the classical debate on bank centrality by assessing such a centrality to the Eurozone scale. As discussed by a lot of scholars, bank centrality is the most constant structural property of interlocking directorates in most national contexts. This property has been successively considered as an evidence of bank control over industry (Zeitlin 1974 ; Mariolis 1975) or bank hegemony (Mokken & Sokman 1978 ; Mintz & Schwartz 1985). In line with our own theoretical explanation of this property (Dudouet et al. 2015), we will propose to define bank centrality as an indicator of the social structures of currency issue. This is the main reason why we measure bank centrality at the Eurozone level rather than at the EU level. Beyond this theoretical renewal, we would like to extend the classical concept of bank centrality to the one of financial centrality, and to retrieve it from the directors' profiles rather than from the companies' sectors. We will do this by 1/ identifying the directors' profiles out from a sequential analysis of their professional career 2/ matching these profiles from both the structures of their career and their scores of centrality. Our paper will reveal a clear domination of finance-based profiles among the men and women who were leading the Eurozone business milieu in the 2005-2010 period. The study focuses on 123 directors who have been sitting on the boards of at least two foreign firms for at least one year throughout the 2005-2010 period.

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Interorganizational Networks and Strategy: Evidence from an Italian Footwear District

Riccardo De Vita (University of Greenwich), Stefano Ghinai (University of Bologna), Alessandro Sinatra (Università Cattaneo LIUC)

Recent studies about industrial districts, partially challenging longstanding assumptions, emphasise the importance of the relational dimension in understanding district firms' behaviours and performance. This research contributes to this debate, by focusing on the footwear Italian district in the area of Parabiago - Italy. The area leverages the presence of leading firms with international reputation for their high-quality production; at the same time, it is experiencing structural challenges associated with new competitive dynamics. A questionnaire integrating established measures to capture the strategic orientation of firms together with network-based questions was administered to 58 firms, obtaining 39 answers. 7 focus groups were held with local entrepreneurs to corroborate research findings

and to collect further qualitative data about the strategic needs of the district. The paper will present results from analysis exploring the association between the strategy and ownership structure of the firms and their position in several knowledge networks. Consistently with previous studies the exchange of market, technological and managerial knowledge was mapped. As well as contributing to a vital academic debate, the paper has the potential to influence managerial and policy decision making. The importance to sustain inter-organizational networking has been identified by local stakeholders as one of the strategic priorities for the district; moreover, it is expected that further studies involving other footwear districts in Italy will be carried out, allowing for comparative analysis.

Quantifying Political Power: Applied Network Research Approach

Alina Vladimirova (National Research University Higher School of Economics), Valentina Kuskova (National Research University Higher School of Economics)

Development of network analysis equips political power researchers with a very promising set of tools. Multiplex and signed networks, positional analysis and structural balance, exponential random graphs and Siena models. Even this short and uncomplete list can leave a strong impression that now we have an opportunity to answer questions, which bothered us for decades. We completely agree that a bloom of network approach to political power is fascinating, but we would like to address a serious pitfall of applied network analysis for our field. The problem is that we need to construct networks based on a concept traditionally criticized for inconsistent measures and undefined terms. Do we really develop complex mathematical models to study a concept unsuitable for quantification? Probably the most infamous part of political power domain is empirical analysis of power in international relations. Not only critique is severe, but also the whole present situation is quite confusing. Every year a range of well-known think-tanks publish their soft power indexes, while Nye, the author of the concept, doubts a possibility of such analysis. While everybody agrees on a need to account for intangible resources of power, there is no consensus on how to measure them. Network analysis is not free from this discussion as well. Thus, in our paper we show a way to deal with quantification of power and present a method that can be used to construct interstate networks.

Exploring the impact of location on university-business relationships in Belgium: a social network approach

Jef Vlegels (Vrije Universiteit Brussel, Belgium), Andre Spithoven (Vrije Universiteit Brussel, Belgium)

Conceptually and empirically, relations between university and innovating businesses have been centre stage for some time. The research context focuses on the relationship established as a consequence of business contract research. University-industry linkages come in many shapes and forms. As indicated by the literature on distributed innovation (Coombs et al., 2003) and innovation systems (Godin and Gingras, 2000; Charles, 2006), overall businesses have various relationships with external organisations. Universities, likewise, maintain a multitude of relationships with private companies (see e.g. D'Este and Patel, 2007). There is now a large empirical body of research on university-company linkages based on large surveys, patent (citation) analyses, bibliometric research and case study material (Fontana et al., 2006). Notwithstanding the large attention in empirical studies on university-company knowledge transfer, the practice of R&D contract research to universities remains understudied as a particular source of knowledge. Hence the paper meets the call from D'Este and Patel (2007) to do further research on the variety of relationships between universities and companies. This research focussed on the market-mediated contract research by businesses in order to acquire university research. This type of knowledge transfer is considered one of the less formal linkages involving monetary flows. Within this context the research brings out the business characteristics in their location choice and at the same time account for the university quality in terms of bibliometric data from universities. Although it has become an accepted premises that location is vital for knowledge exchange; an inquiry into this issue between universities and business is currently lacking. Because existing literature posits that location is a key facilitator for knowledge transfer activities, it is considered extensively in this paper. Based on a panel of three consecutive waves of R&D surveys conducted in 2006, 2008 and 2010, the linkages of universities with R&D active businesses are empirically examined by merging two separate databases - one on university R&D investments and one on business R&D investments. We use this database to construct a two-mode network of firms and universities and we use bipartite Exponential Random Graph models to predict university industry linkages based on network characteristics, node attributes and location. The preliminary findings, because of the explorative nature of the research, highlight at present three main findings. First, the R&D intensity of a business has a positive impact on contract research. Second, the size (and quality?) of the university is important in the selection for business contract

out. Third, the continuous measure of geographical distance showed a nonlinear U-shaped relation to the value of contract research: on the one hand universities located nearby can be seen to be part of the technology cluster of the company, on the other hand when the desired knowledge is located at far away universities these are also eligible partners for contract research. The results in this paper will provide some insights on how science policy may reinforce regional innovation systems by acknowledging the role played by universities without enforcing universities to sell out the family silver and become 'entrepreneurial' organisations.

Social Support Dynamics and Happiness of LGBT Adults

Mia Vogel (University of Washington), Bernd Wurpts (University of Washington)

While social network analysis is useful for understanding the relationship between individuals and their social environments, network studies on the social relations of members of lesbian, gay, bisexual, and transgender (LGBT) populations have been relatively absent from the literature. Recently, researchers have taken a greater interest in studying social networks of LGBT population members, such as work by Erosheva, Kim, Emlet, and Fredriksen-Goldsen (2015). The aim of this egocentric network analysis is to determine the effect of social support on level of perceived happiness among LGBT Americans and to propose mechanisms by which social support contributes to happiness within LGBT populations. Hypothesized mechanisms include the disclosure of LGBT identity to core family members, its timing, and its effect on these relationships.

In this study we used survey data from Pew Research Center's A Survey of LGBT Americans: Attitudes, Experiences and Values in Changing Times (2013). The survey, administered online, includes 1197 participants who identified as members of LGBT populations.

While we recognize social relationships outside the family, such as friendships and workplace contacts, the emphasis of this study is on core family relationships. We analyzed levels of social support in families by examining the disclosure of one's LGBT identity to different core family members, which oftentimes affected these relationships. Life events such as coming out may have an effect not only on personal relationships and family support, but may also affect future life happiness of LGBT adults. We therefore examined the timing of disclosure, age at which the individual self-identified as LGBT, and their interaction with family as predictors of future happiness.

To assess the relationship between life happiness and social support of LGBT adults, we used multiple regression models. In particular, we regressed life happiness on network and other relational variables measuring communication and social support. Preliminary results indicate highest levels of happiness among members of LGBT populations with high levels of social support, namely those who have shared their LGBT identity status with both of their parents. Disclosure of LGBT identity to core family members remains significant when taking into account standard socioeconomic variables.

This study helps to understand how social support within core family relationships contributes to happiness of LGBT American adults. Further network research is needed to examine how the social structures of members of LGBT populations contribute to health and happiness.

The Pew Research Center bears no responsibility for the analyses or interpretations of the data presented here.

Stick together and teach on: How do the characteristics of the collegial network influence newly qualified teachers' social informal learning and in turn their job satisfaction?

Sanne De Vos (Odisee Aalst), Johan De Wilde (Odisee Aalst), Simon Beusaert (Odisee Aalst), Chloé Meredith (KU Leuven-Kulak)

How to make sure that newly qualified teachers keep teaching? Research shows that the job satisfaction of young teachers determines to a great extent if they dropout or not. Literature suggests that one of the reasons for the low level of job satisfaction in novice teachers can be found in the lack of support at school. Novice teachers are supported informally by their colleagues, who also provide them with practical information, help and feedback, but not every collegial network provides equal learning opportunities. The characteristics of the collegial network needs to be taken into account, i.e. the accessibility of the network, the knowledge present in the network, appreciation of this knowledge by the member of the network and the psychological safety of the members. Thus, this project studies the mediating role of social informal learning between the characteristics of the collegial network and newly qualified

teachers' job satisfaction. This project tries to open the black box of social informal learning, or more specifically the exchange of feedback, information and help with colleagues. First data will be collected from novice teachers (< 3 years of experience) teaching in the Dutch speaking community of Belgium. The results from this first cross-sectional questionnaire study will be reported on the Sunbelt conference.

Importance of social networks for different marketing models of advanced cookstove technology: A case study from Kenya

Gregor Vulturius (Stockholm Environment Institute), Hannah Wanjiru (Stockholm Environment Institute), Fiona Lambe (Stockholm Environment Institute), Caroline Ochieng (Stockholm Environment Institute), Steve Cinderby (Stockholm Environment Institute)

The dependence of 2.6 billion people on traditional biomass fuels - such as firewood, charcoal and dung - for cooking and heating has significant negative impacts of health, causing more than 4 million premature deaths annually. Despite decade long efforts by aid and development organizations, adoption of advanced cookstoves that emit less harmful particles associated with respiratory diseases and, by extension, climate change has been sluggish. Lack of accesses to knowledge and resources has been identified as one of the key barriers for more widespread uptake of advanced cookstoves in the developing world. Research on global health has recently started to focus on social networks to better understand diffusion and adoption of improved cookstove technology among individuals and communities. Previous research in for example Bangladesh has shown that social learning through social networks induced by targeted marketing influences the demand for improved cook stoves. This study compares two different marketing models of two local NGO's engaged in marketing advanced biomass cookstoves in Kenya. In both cases, the respective NGO works primarily as distributor, linking stove producers and financial organizations with stove users. In the first case, the NGO is a microfinance organization that offers members of women groups loans to purchase improved stoves in return for guarantees and regular repayments. The second NGO uses a conventional distribution model focusing on direct marketing and retailing of advanced stoves. Data for this study comes from a series of focus group interviews conducted with 31 users of improved cookstoves distributed by either NGO. The data collection involved construction of individual social network using group discussions, flipcharts and post-it notes. Background information about the occupation of each research participant was also obtained and used as a control variable in the data analysis. The qualitative approach taken in this study allows us to develop a deeper understanding of the influence of social network on the diffusion and adoption of advanced cook stoves at the individual level and community level. The data is currently being analyzed using qualitative data analysis software and quantitative social network analysis software. Preliminary results from the interviews indicate that close social relationships benefit the diffusion and adoption of improved cookstoves which favors the distribution model of the first NGO. Findings will also show how the two different marketing models have been able to use existing social networks to disseminate knowledge and resources and influence individual's decision making regarding cook stoves. Results of this research offer valuable insights for international development agencies and local NGO's seeking to promote the adoption of clean energy technology in developing countries.

Influence of social networks, social norms, and cultural beliefs on HIV risk and testing behavior among African American women

Karla Wagner (University of Nevada, Reno), Hank Green (RAND), Jamila Stockman (University of California, San Diego)

African American (AA) women are disproportionately affected by HIV/AIDS. Research has shown that demographic, psychosocial, and behavioral factors are associated with HIV risk, yet these factors do not fully explain racial disparities in HIV/AIDS. Social networks not only create structures that can facilitate or inhibit viral transmission, but they also facilitate the maintenance of social norms and values that influence HIV risk behavior and uptake of HIV testing. In many AA communities, beliefs and norms such as medical mistrust and interconnectedness influence HIV risk and protective behavior, but have not yet been examined from a network perspective. The CONnect the DOTS study (Capitalizing On Networks to Decrease Obstacles to HIV Testing) uses a 2-wave personal social network design to examine the influence of social networks, social norms, and cultural beliefs on HIV risk behavior and uptake of HIV testing among AA women in Reno, NV. While considerable research among substance users and African Americans at risk for HIV has been conducted in the Northeastern US, where AAs make up a larger share of the population, comparatively less research has occurred the Western US and in smaller communities where AAs are less represented

in the overall population. We will present results from the the pilot phase of the study, in which ten AA women at risk for HIV will complete a personal network survey using EgoWeb and will each refer up to five functional opinion leaders in their networks based on 4 criteria (degree, core group membership, personal opinion leader, and community leader). These alters will also complete the personal social network survey (total N=60). Analyses will examine how opinions and beliefs held by AA women and their influential network members are associated with HIV risk and uptake of HIV testing behavior. Dyadic analysis will be used to examine correspondence in behaviors and beliefs between egos and alters. Findings from the pilot phase will be used to inform the full study, in which we will recruit 75 AA women and up to 375 of their network alters.

A Network-based Approach to Scoping Rumor Stories in Social Media

Logan Walls (University of Washington), Kate Starbird (University of Washington), Emma Spiro (University of Washington)

Social media and online social networks have become important platforms for communication, peer influence, information exchange, and social interaction. For researchers, these new environments offer vast opportunities to compile large-scale datasets comprised of digital traces which facilitate unobtrusive study of human behavior. To address important questions within the network field, and the social sciences more generally, it is often necessary to employ high-cost methods (e.g. qualitative labeling of content and/or users) to identify and extract content of interest, distinguishing signal in the data from “noise.” Since the content of interest within a given dataset depends on the research question being asked, the process of filtering a dataset to yield a subset suitable for a given research question, what we refer to as “data scoping”, is a crucial step in the research process. In this work, we introduce a method for scoping stories in social media data by representing relationships among posts as a network. We divide data into tractable subsets by grouping data with similar temporal characteristics together, and then apply a clustering algorithm to each group in order to construct a nearest-neighbor graph representation. Our method exploits the properties of this network (e.g. connected components) to find characteristically similar sub-networks of posts in each temporal group. We experiment with different strategies for merging these sub-networks to allow patterns to persist over time. Finally, we apply our method to the case of scoping rumors on Twitter during crisis events, comparing our approach with simple text-based methods and human experts.

Do we need to distinguish the motivation between Organizational Citizenship Behavior and ingratiation

Daojin Wang (SEU), Hongjiang Lyu (SEU)

Although the Organizational Citizenship Behavior theory and ingratiation theory have been put forward for a long time, few studies has told us what measures should be taken when the leaders can't distinguish between Organizational Citizenship Behavior and ingratiation. In this paper, Survey data were collected at two different time points from 338 subordinate and 128 their supervisors from 6 electronic manufacturing enterprises located in Beijing, china. we found it is positive that the link between trust in supervisor and team performance ; trust in supervisor has positive impact on Organizational Citizenship Behavior; trust in supervisor has positive impact on ingratiation behavior; the relationships between Organizational Citizenship Behavior and team performance is positive; and the relationships between ingratiation behavior and team performance is also positive. Thus, the conclusion of this paper is that the leaders encourage such surface friendly behavior recurring , when managements make sure their subordinates trust in themselves, their subordinates' behaviors are good for team performance and colleagues, and they can't make sure such kind of behavior is organizational citizenship behavior or ingratiation behavior. If the supervisors encourage those surface beneficial behavior recurring, it will help improve the team's performance. If the supervisors make a wrong subjective judgment of such behavior is organizational citizenship behavior or ingratiation, they may take the inappropriate policy or actions. It may damage to the team's performance and the emotion of employees.

Love Your Enemies: The Evolution of Network Ties and Team Performance in Major League Baseball, 1985 - 2013

Lan Wang (Boston University)

Dynamic team composition is ubiquitous yet underexplored in team research. I develop a framework that explores the effect of network evolution through career mobility on team performance. Using a longitudinal dataset of 5,490

baseball players in 30 teams in Major League Baseball between 1985 and 2013, and 28,454,220 accumulated network ties among teams, I find that when accounting for increased team quality, a team's external ties have a positive effect on subsequent wins, and explain why frequent team member change increases team performance. Moreover, a team's internal ties and external ties have a significant non-linear interaction that when internal ties are low, the benefit of external ties on team performance would diminish as these external ties continue to grow, while when internal ties are high, the negative return of external ties would eventually become positive. This study suggests a contingency theory of team composition that the benefits of dynamic team composition are contingent upon a team's connection with a larger context, its absorptive capacity, and its team members' career history. It highlights the importance of team composition from a social network perspective and that effective teams need to look beyond team boundaries and embrace their enemies as a source of career capital.

From crowdfunding to co-production: Community building towards collective action on Kickstarter

Rong Wang (University of Southern California), Li Lu (University of Southern California), Janet Fulk (University of Southern California)

Crowdfunding is a novel method for funding new ventures, allowing individuals, teams or organizations to initiate an open call for the provision of financial resources, often in return for future products or equity. Crowdfunding projects vary greatly in categories, goals, and magnitudes. This study focuses on the use of crowdfunding for the production of public goods by examining the backing networks centered on crowdfunded projects that utilize Creative Commons (CC) licenses. Specifically, it analyzes the dynamics between backers and creators to determine what network mechanisms drive the community building for crowdfunded public goods. It is well recognized by scholars that the main objective of crowdfunding is to reach the pledge threshold of investment through social networks. Research has examined what project features are likely to lead to successful funding and what communication mechanisms are most effective for creators to secure the confidence of backers. However, less attention has been given to the role that backers play in influencing the dynamics of the crowdfunding process. Guided by public goods theories, this study focuses on a particular category of crowdfunding activities that aim to provide final outputs to the public for free. We define crowdfunding as a hybrid innovation model of private investment and collective action. We further conceptualize that crowdfunding platforms not only function as a source for financial capital, but also a space for both backers and creators to engage in co-production.

In this study, the unit of analysis is individual users on Kickstarter. The sample of the users included all the creators and backers of 65 CC projects curated by Kickstarter. Backing network data and user information were coded. After removing inactive accounts, 1206 users and 1572 ties were retained for further analysis. Preliminary results from Exponential Random Graph Modeling (ERGM) showed that the collective action network in crowdfunding was more likely to form transitive ties. CC project creators played an important role in driving the network and they did not limit their networks to just their peers. The effect of preferential attachment on forming backing ties was significant and positive, mainly attributed to the number of projects a user created. Furthermore, users with experience in creating design, fashion, journalism or music projects were more likely to engage in the public goods network. Further analysis will use topic modeling to identify user self-reported expertise and personality factors, and examine how these variables affect the network structure. Community detection analysis will also be conducted. This research offers several important contributions. First, it is the first attempt to study unique features of crowdfunded public goods projects as opposed to typical projects that produce private goods. Second, the research applies public goods theories to crowdfunded CC projects, a new application of these theories and a novel lens on the crowdfunding process. Third, it focuses on dynamics between creators and backers, rather than just the attributes or behaviors of creators and their projects. Finally, it demonstrates the value of a network theoretical perspective for understanding the new phenomenon of crowdfunding. (word count: 497)

Combined analysis of social structure and individual outcomes using ERGMs.

Peng Wang (Swinburne University of Technology), Dean Lusher (Swinburne University of Technology), Johan Koskinen (The University of Manchester), Garry Robins (The University of Melbourne)

Exponential Random Graph Models (ERGMs) test how other network ties and nodal attributes may affect tie formation and the overall network structure. However, they do not address how network structure may affect nodal attributes, or individual outcomes. Auto-logistic Actor Attribute Models (ALAAMs) address such issue by modelling individual

outcomes as dependent variables. However, ALAAMs treat network structures as exogenous and not liable to changes. ERGMs and ALAAMs separate social selection and social influence processes, both of which occur simultaneously in social systems.

Assuming the interdependent nature of network activities and individual outcomes, we combine and extend the features ERGMs and ALAAMs into a modelling framework where both network structure and individual outcomes are modelled together. The proposed models eliminate presumptions of whether social selection or influence processes dominates a given social context by combining social selection and social influence processes into a unified model. In contrast to Stochastic Actor Oriented Models (SAOMs) for longitudinal network data, the proposed model offers a modelling framework for cross-section network data. A generalizable data structure representing both networks and nodal attributes is presented. The proposed model specifications are demonstrated with simulation studies, including higher-order configurations beyond dyadic effects that may alleviate model degeneracy. The empirical modelling examples illustrate the power and flexibility of the modelling framework and its empirical and theoretical implications.

Focus statistics for testing network centrality on uncorrelated random graphs

Tai-Chi Wang (Institute of Statistical Science, Academia Sinica), Frederick Phoa (Institute of Statistical Science, Academia Sinica)

Network centrality has been addressed for more than thirty years, however, few studies provided statistical tests for verifying this network characteristic. By applying the idea of focus test in spatial analysis, we propose a statistical method to test the centrality of a network. We consider not only the degree of node, but also give weights on other nodes with different lengths of the shortest paths, which are called “distances” in networks. According to the density of distance based on the hidden variable model and the property of the multinomial distribution, a test statistic called “focus centrality” is provided to evaluate a network centrality. Besides the theoretical construction, we verify that the proposed method is feasible and effective in the simulation studies. Further, two empirical network data are studied as demonstrations.

Examining Yelp Business Network Using Homophily Theory

Yuehan Wang (University of Southern California)

A lot of studies have been done about Yelp such as evaluating the trustworthiness of Yelp reviews, finding the local experts on Yelp, and the influence of Yelp reviews on local business. However, there is no study using network theory to examine the Yelp dataset to figure out the relationship among reviews, users, and businesses on the Yelp community.

This study makes contributions to previous Yelp studies by using The Theory of Homophily and Social Influence Theory to test if businesses with same star ratings or similar review counts are more likely to form ties in the community. The Yelp dataset includes businesses from four different countries: Edinburgh, U.K.; Karlsruhe, Germany; Montreal and Waterloo, Canada; Pittsburgh, Charlotte, Urbana-Champaign, Phoenix, Las Vegas and Madison, U.S. Due to the inconvenience of running, a subset of the hotel/casino businesses in Las Vegas was extracted which includes business_id, stars (star rating) and review-count. Since the businesses are in Las Vegas, the review session includes all the reviews on the hotels/casinos in Las Vegas only.

A nodecov in ERGM model was run to test the hypothesis that businesses that have more reviews are more likely to form more ties with other businesses in the Yelp business network, and this hypothesis is supported. The hypothesis that businesses with similar star ratings are more likely to form ties is not supported. A nodefactor in ERGM was run to test whether business with a higher star ratings will get more ties. It is interesting to find that only the business with 4 stars are more likely to get more ties with a significant P value which is 0.015. For the rest of businesses with star ratings from 2, 2.5, 3, 3.5, 4.5, the hypothesis is not supported. An adsdiff test was run in the ERGM to see if businesses with the similar number of reviews are more likely to form ties, and the hypothesis is supported. The implications of this study is explored and discussed in this study.

Siena models of interdependent use of cigarettes, alcohol, and marijuana

Cheng Wang (University of Notre Dame), John Hipp (University of California, Irvine), Carter Butts (University of California, Irvine), Rupa Jose (University of California, Irvine), Cynthia Lakon (University of California, Irvine)

One body of literature has focused on how network evolution gives rise to influence and selection effects within adolescent networks regarding a specific substance use behavior (e.g., alcohol use, smoking), whereas another body of literature has focused on how certain substance use behaviors might act as “gateway” drugs that lead to substance use with other drugs. In this paper we join these two literatures by examines both peer and parental influences simultaneously with peer influence and selection processes to understand the interdependent use of cigarettes, alcohol, and marijuana among these adolescents, guided by ecological models of human development. Typical studies to date employing the Stochastic Actor-Based (SAB) modeling approach to investigate adolescent substance use have commonly focused on one behavior at a time (i.e., smoking or drinking). The exceptions to this general trend are typically limited to relatively small samples, and therefore have limited statistical power to explore the simultaneous dynamics of network friendship decisions along with decisions regarding usage of three different substances. We remedy these statistical power issues by using three waves of network data for adolescents in 14 schools and their substance use activity regarding alcohol use, marijuana use, and tobacco from Add Health. We constructed separate networks for the two largest schools, one a rural Midwest public high school ($n = 1,024$) referred to as Jefferson, and one a suburban Northeast public high school ($n = 2,104$) referred to as Sunshine High. We also combined the remaining 12 schools into a small school sample ($n < 200$ students each) of 1,284 students. A methodological challenge is that whereas the questions about friendship ties, smoking behavior, and alcohol use were asked at all three waves, the questions about marijuana use were only asked at waves 2 and 3. One approach would simply discard all this information at wave 1 - however, such a strategy effectively ignores this earlier information, which is a strong assumption given our interest in the co-evolution of network ties and interdependent substance use. We instead adopted an approach in which we imputed adolescent marijuana use at wave 1 based on four questions. This imputation strategy enables us to estimate a three-wave SAB model for each of the three networks, and avoid discarding an entire wave of data. We compare the results of the two-wave and three-wave SAB models for each network to demonstrate the efficacy of this approach. Briefly, our key findings are: 1) selection effects are observed related to alcohol or smoking behavior, but are particularly strong for marijuana use; 2) influence effects are observed from friends' alcohol use and smoking use, but very strong influence effects from friends' pot use; 3) regarding interdependent drug use, marijuana use tends to lead to more smoking and drinking behavior over time, but there is little evidence that the usage of the other two substances leads to more marijuana use.

The International Trade Network: Sanctions Performing As A Strength Test Of Economic Ties

Yulia Wasserman (National Research University Higher School of Economics), Valentina Kuskova (National Research University Higher School of Economics)

International economy suffers from the sanctions applied to Russia due to the Crimea situation and reverse sanctions from Russia in response. There is a large body of political and economic literature about sanction effectiveness and analyses of the economic effect on countries' economies coming up and going back to the Iraqi case. Their main focus is the effect of the sanctions on the targeted country and the side effect for the sanctioning countries: the assessment of loss and effectiveness of sanction application. This proposed research aims to bring a network analysis of the sanction effect on the economic ties themselves as part of the international trade network. This paper tells how sanctions influence strong and weak ties between countries based on the inflow and outflow of goods and materials, and if Information Technology (IT) can be indirectly considered as a scarce resource within international trade system. Network analysis of the sanctions' effect will bring a clearer picture of the ties' characteristics and show their elasticity.

California Uber Alles: Using Stochastic Actor-Oriented Models to Analyse Network Dynamics of Hardcore Punk in the USA 1979-1986.

Joe Watson (University of Manchester)

This paper builds upon recent publications that use Becker's (1982) concept of 'art worlds' as theoretical grounding to produce empirical music networks with geographical and temporal boundaries. Using statistical models, I explore the dynamics and mechanisms of the hardcore punk music network in the USA from 1979-1986. In addition to network growth, I explain the notion of network activity and how this differs from concepts of network dynamics discussed by other scholars of 'music worlds' (Crossley, McAndrew and Widdop, 2015). I argue that through a comprehensive understanding of the hardcore punk world, I was able to identify mechanisms of tie formation that informed appropriate model choices. This paper draws on data collected from gig flyers, cross-referenced with biographies and authoritative

histories. Eight undirected networks were created for each discrete year 1979-1986, where ties between bands were present if those bands played together at least three times in a given year. The networks were analysed pair-wise for seven sequential pairs of years 1979-1986 using stochastic actor-oriented models with the unilateral initiative and reciprocal confirmation specification. Two separate analyses were conducted for network growth, where ties were simply accumulated; and network activity, where ties were both gained and lost. The key result was that there was a strong preference by bands over time to form ties with others whose tie patterns were different to their own (not structurally equivalent), indicating a structure where some bands progress to be headliners whilst others play the role of support bands. I propose that this structure may have been beneficial to established bands but detrimental for late joiners to the network.

Network Awareness: The Development and Validation of a Scale

Brooke Foucault Welles (Northeastern University), Michael A. Stefanone (University at Buffalo), Christo Wilson (Northeastern University)

Networks contain information and other resources that are essential for individual and team performance. However, the ability to make use of those resources depends on being able to identify and access the right resources at the right times. Doing so is a cognitively challenging task, and a long history of social networks research suggests that people rarely recall their personal social networks accurately or effectively. The reasons given for errors in recall are numerous, including variations in network structure, network position, tie strength and personality. With a few notable exceptions, the capacity of individual actors to understand social networks is rarely considered in studies of network recall. Unlike other social science approaches that emphasize individual agency, social network research tends to prioritize the pattern of relationships over the individuals within the networks. This may discount the relative importance of individual cognitive resources in network recall.

In this paper, we discuss the development and validation of a self-report scale that measures Network Awareness, or the tendency for individuals to dedicate cognitive resources to monitoring the complex network of interactions within one's social environment. Network awareness stems literature in the social sciences on theories of self interest that posit that people make rational choices when they interact with their social environments. These theories predict that people will monitor their social environments and adjust their own behaviors to maximize personal benefit and minimize personal cost. Our proposed construct of Network Awareness predicts that individuals differentially dedicate cognitive resources to monitoring the relationships within their social networks in order to optimize networked behavior, such that some individuals are more likely to think about social structure and dynamics.

Using a multi-method approach (online survey, lab study), we developed and validated a Network Awareness scale. 393 participants completed an online survey of candidate Network Awareness scale items. A principal component analysis revealed four Network Awareness factors - Structural Awareness, Network Efficacy, Network Advantage and Network Actualization - consisting of 3-9 items each, and explaining 62% of the total variance in scale response. Next, 153 participants completed a lab study using a custom-designed Facebook data collection tool to validate the Network Awareness scale items as predictors of network recall. Results show that only network efficacy and network advantage subscales significantly predict weak tie recall performance, after controlling for variations in social network size and diversity. This suggests that Network Awareness is a discriminate psychological construct that accurately predicts variations in network recall, and that our Network Awareness scale may be used to measure these variations without observational data.

Does ending homelessness change social networks and support?

Suzanne Wenzel (USC SOCIAL WORK), Harmony Rhoades (USC), Hailey Winetrobe (USC), Benjamin Henwood (USC Social Work), Eric Rice (University of Southern California)

Background and Purpose: Ending homelessness through the provision of permanent supportive housing (PSH) can put individuals on a path toward improved health and well-being. Change in behavioral health over time has received increasing attention among formerly chronically homeless persons who have transitioned to PSH. Despite the importance social networks to the health and well-being of homeless individuals, no examination of how the networks of formerly homeless individuals change in the context of PSH. We systematically investigated social relationships and support among chronically homeless persons moving into PSH. We were interested in determining the extent to which social networks changed - for example, whether the availability of tangible, informational, and emotional

support increased among residents in PSH - and whether these network changes were associated with substance use and mental health. Methods: One-on-one structured interviews were conducted with chronically homeless individuals upon acceptance into permanent supportive housing (PSH) in Los Angeles County and again three months after these individuals moved into their housing. Study eligibility criteria were age 40 or older and history of chronic homelessness. The study sample consisted of 284 persons who had completed both baseline and 3-month follow-up interviews. Data describing ego-centric social networks and support, as well as participant demographics, substance use (NIDA-modified ASSIST and NIAA Task Force questions) and mental health (PC-PTSD screener) were collected using computer-assisted personal interviewing. Descriptive and univariable analyses were conducted using chi-squared or t-tests, as appropriate.

Results: Participants were predominately African American (59%) and male (68%), with a minority of veterans (23%). Prior to housing, mean network size was 8.7 persons (sd=4.9) and 33% of persons reported increased network size three months later. Only a minority reported increased numbers of persons in their network providing support of various kinds - 26% reported more tangible support, 28% more informational support, 33% more emotional support, and 27% more financial support. A minority also reported increases in negative support - 24% reported more conflict. Women were more likely to report increased informational support and emotional support. Veterans were less likely to report increased tangible support, whereas African Americans were more likely to report increased tangible support. Persons who reported increased conflict in their network were more likely to report using hard drugs three months later. Persons who reported increased levels of instrumental support were less likely to report trauma symptoms three months after housing, whereas persons with increased levels of conflict in their network were more likely to report trauma three months after housing. Discussion: That a minority of persons who entered PSH reported increases in supportive relationships after housing was unexpected. Changes in network composition, however, were associated with both mental health and substance use. Networks that change to involve more conflict were associated with both trauma and substance use three months later, whereas increased levels instrumental support were associated with less trauma. Formerly chronically homeless persons may need additional support from case managers and therapists to facilitate supportive networks.

Patent Citation Distance: Measuring Trends in Combinatorial Innovation

Ryan Whalen (Northwestern University), Noshir Contractor (Northwestern University)

Patent citation analysis provides important insight into the innovation process, enabling analysis of collaborative work, knowledge flows, and idea recombinations. However, as with most citation analyses, prior art citations are hampered by a lack of nuance. The vast majority of patent citation analysis research treats prior art citations as a binary construct, they either exist or do not. This practice glosses over the varied types of relationships that patents have with one another, leaving scholars unable to distinguish between qualitatively different knowledge relationships.

In order to improve the power of patent prior art citation analyses, we propose and demonstrate a series of "citation knowledge distance" weighting measures that account for the topical distance between patents. By providing insight into the ways inventors search for and combine ideas, these measures enable more nuanced analysis of knowledge flows and recombinations.

To calculate our measures, we first perform latent semantic analysis dimensional reduction on all U.S. utility patents granted between 1976 and 2014. We then calculate the cosine distance between patents in this latent semantic space, weighting over 52,000,000 citations by the topical distance between the citing and cited references, as well as weighting the relationships between random samples of co-citing and co-cited references. We propose and demonstrate four citation distance measures:

Knowledge translation: Defined as the backward citation distance between a focal patent and its prior art references, this measure provides insight into the degree to which researchers have translated distant knowledge to their own discipline.

Knowledge integration: Defined as the size of the minimum spanning tree of a distance-weighted fully-connected graph consisting of all the co-cited references of a focal patent, this measure provides insight into the variety of knowledge researchers integrate into a single invention.

Knowledge diffusion: Defined as the forward citation distance between a focal patent and the future patents that cite it, this measure provides insight into the degree to which the knowledge within a patent diffuses to topically distant fields.

Knowledge scope: Defined as the size of the minimum spanning tree of a distance-weighted fully connected graph consisting of all the co-citing references of a focal patent, this measure provides insight into the degree to which an invention goes on to influence varied technical fields.

We analyze these measures across the patent system from 1976 to 2014. Doing so reveals substantial changes in the manner that innovation occurs. We demonstrate that researchers have steadily reached further and further in search of inspiration, leading to steadily increasing knowledge translation scores. Furthermore, once distinct technical fields are converging towards a universally high degree of knowledge translation. We also find that the average distance between co-cited patents has steadily decreased, the pace of knowledge diffusion has increased, and the distance between co-citing patents has decreased while also become more varied.

These measures show promise in improving our understanding of the innovation system, especially for researchers interested in many aspects of innovation networks including the study of teamwork and collaboration networks, as well as interorganizational and geographic knowledge flows.

Health, Healthcare, and Community Networks: Applied Studies in Organizational SNA

Malcolm Williams (RAND), Ryan Brown (RAND), Danielle Varda (UC Denver)

To address the severity of cardiovascular disease (CVD) in the United States, the Centers for Disease Control and Prevention (CDC) and the Centers for Medicare and Medicaid (CMS) implemented the Million Hearts (MH) Initiative, an intervention focused on strengthening and supporting partnerships to promote cardiovascular health. Network interventions, such as the MH Initiative, involve the coordination of public, private and non-profit entities around a shared goal, and are viable strategies for addressing complex public health issues.

Researchers at RAND and the University of Colorado at Denver (UCD) will examine the partnerships leveraged for the MH Initiative. The goals of this study are as follows: 1) Describe the partnership engagement process and level of strength and interaction among partners in the MH Initiative; 2) Assess changes in the activities, programs, policies, or systems that have occurred as a result of the MH Initiative; 3) Identify facilitators and barriers to public-private partnerships with the federal government; and 4) Synthesize the information obtained through the above three aims to inform future partnership efforts.

Approach: To accomplish the aims, we will employ a mixed methods approach that involves:

- o A scan of the published and grey literature to identify key elements of the MH Initiative and develop a framework for how stakeholders are connected;
- o Key informant interviews to gain a more nuanced understanding of MH Initiative partnerships, the best practices for partnership engagement, and the strategies used to achieve MH Initiative goals. We will seek input from federal agencies, state and local entities, and public and private-sector partners involved in the MH Initiative.
- o A social network analysis (SNA) to characterize the interorganizational network, assess the level of engagement between partners, and measure partners' perceptions of collaboration and success in reaching MH Initiative goals.

The Co-evolution of Networks and Personality

Meredith Woehler (University of Kentucky), Theresa Floyd (University of Montana), Wookje Sung (University of Kentucky), Jesse Fagan (University of Kentucky), Filip Agneessens (University of Surrey), Travis Grosser (University of Connecticut), Giuseppe - Joe Labianca (University of Kentucky)

Two perspectives in network research have differing views about how network structure and the individuals within networks influence each other: The network patterning perspective (also called structural determinism) posits that individual opportunities and outcomes are largely determined by the network structure in which people are embedded. In contrast, the individual agency perspective posits that the ways people manage and change their personal networks are governed by individual differences, including dispositional differences like self-monitoring, and that agentic changes in individual networks affect the characteristics and outcomes of individual networks, as well as the macro network structure.

A third conceptualization, a coevolution perspective, incorporates both perspectives. It agrees that individual choices for action are constrained by existing network structure, but also acknowledges that network structure is not exogenous - that micro-level changes made by purposive individuals combine to determine macro-level network characteristics. Therefore, network structure and individual agency influence - and are influenced by - each other.

We use SIENA models and polynomial regression to examine potential co-evolution of network structure and self-monitoring personality, using pre-post data collected during and after the merger of two multinational organizations. We also test how the strength of the situation - defined by the extent of pressure from top management for integration of the legacy organizations - affects the co-evolution process

The Ups and Downs of Network Churn: How Much is Too Much?

Meredith Woehler (University of Kentucky), Wyatt Taylor (University of Kentucky)

This paper explores brokerage churn in the context of a major organizational shock - a merger. Using email network communications, this study explores how brokerage ties form and decay in a highly uncertain environment. We examine how anticipated merger-related role uncertainty predicts network churn. We evaluate how tie change and preservation affect objective and subjective individual performance. Results show that brokers who seek new ties do see increased performance benefits after the merger, though these benefits also exist for those who develop advantageous networks as a byproduct of organizational restructuring. Further, we discover that brokers who anticipated merger related role uncertainty "overcorrected" when churning their network, leading to suboptimal objective performance, and their own subjective perception of poor performance. Finally, we discover an inverted u-shaped relationship between frequency of network churn and objective performance. We discuss the implications of our findings for future avenues of research on brokerage and network churn.

Nomination Order and Alter Attributes in Adolescent Ego Networks

Mike Wood (University of Notre Dame), Ethan Fridmanski (University of Notre Dame)

This study presents an analysis of the ego networks of American adolescents ages 13-17. Using data from the first wave of the National Survey of Youth and Religion (NSYR 2002-2003), we demonstrate that nomination order in an ego network (whether a friend is named first, second, third, fourth or fifth in responses to a name generator) significantly predicts a variety of alter attributes. Past research has found that nomination order is correlated with frequency of contact and geographical closeness. We show that in addition to geographical closeness and frequency of contact nomination order in name generators is correlated to how close an individual is to their alters and also to a variety demographic characteristics such as gender, race, and religion.

To perform the analysis we use a series of hierarchical models while controlling for a variety of demographic variables. Theoretically, the paper will show that the nomination order in name generators is determined by homophily on a number of important demographic characteristics.

The Effect of Consistency between Formal and Informal Management Control on Organizational Performance

Liang Wu (Southeast University), Hongjiang Lyu (Southeast University)

With the advent of the new control era, the consistency between formal and informal control elements has become more important. Mainstream research often separates to discuss the formal and informal management control factors. In this article, three methods: multiplying, subtracting and adding are used to measure the consistency between formal and informal management control, and examine the influence of it on organizational performance. The results show that the consistency between process control and social control has a positive impact on organizational performance. The consistency between process control and cultural control has an inverted U-shaped impact on organizational performance. The consistency between output control and social control consistency has a positive impact on organizational performance. The consistency between output control and cultural control consistency has an inverted U-shaped impact on organizational performance. These findings have an important implication for the study of formal and informal management control of Chinese enterprises in the future.

Trade networks and institutionalization failure in medieval Lubeck, 1311-1361

Bernd Wurpts (University of Washington)

In sociology, research on the economies of the pre-modern era focuses on Italian towns (e.g. Padgett and McLean 2006, van Doosselaere 2009). Not much work has been done on Northern trade, a subject Max Weber (1978) had in

mind but has never fully realized (Kaelber 2003). This study resumes this agenda and examines the organization of medieval trade in Northern European towns. In particular, I determine how social networks affected the development of early market-supporting institutions in late medieval Lubeck (see Hillmann 2013 for an overview). While most studies on institutions focus on success stories, I show the case of a failure in institutionalization of legal recording practices, namely the societates register from Lubeck, and analyze how networks may have been related to the decline of this local market-supporting institution.

The societates register is perhaps the earliest source of systematically recorded trade in Northern Europe (Cordes, Friedland and Sprandel 2003). Earliest surviving records from the societates register between 1311 and 1361 give information about trade partnerships among long-distance traders in late medieval Lubeck. While Lubeck, a northern German town at the intersection of Baltic and North Sea, is lesser known in modern times, it was among the largest towns in the Holy Roman Empire during the late Middle Ages and had imperial town status. Lubeck was also the designated “head” of the medieval Hansa, or Hanseatic League (Selzer 2010, Hammel-Kiesow 2008, Dollinger 1989). Thus, this study describes the probably first recorded local trade networks among Hansa merchants who traded across countries and jurisdictions (Quack 2010). I describe the societates trade register using the tools of social network analysis and study network fragmentation among Hansa traders and network positioning of key political actors over time. Furthermore, I investigate the multiple relations of kinship and trade in medieval Lubeck before and after the Black Death in 1350.

While the meaning of the societates register has been downplayed as a simple trade register, the recording practice had a particular function which makes this dataset uniquely appealing to study “the social relational foundations of economic institutions” (Hillmann 2013:253). The register can be understood as an early local practice to provide legal protection for long-distance traders. It lists voluntary recognitions of obligations and cancellations of debts. This practice was established and conducted by the town hall and council of Lubeck and includes many members and relatives of the council itself. Interestingly, this practice declined in the period of observation which makes this a good case to study failures of institutionalization of local market-supporting practices. Specific hypotheses are derived from the literature on market-supporting institutions and tested using network techniques. These initial reflections and working hypotheses specifically related to the societates register may be linked to broader questions about how economic institutions come from networks (Granovetter 1992, Padgett and Powell 2012, Nee and Oppen 2014).

The Formation of Intention to Contribution in Teamwork: Examining the Roles of Peer Assessment, Extrinsic Motivation, and Average Tie Strength with Teammates

Yu Xu (University of Southern California), Yusi Liu (Zhejiang University)

Although educators assume that team projects can benefit students by exposing them to tasks that require interdependent coordination, giving the same mark to all the teammates may not be a good indicator of individual contribution (Conway, Kember, Sivan, & Wu, 1993; Hayes, Lethbridge & Port, 2003). As a result, those who are opportunistic are likely to become “free riders,” relying on their more conscientious team members to pick up the slack. This situation illustrates an example of “the tragedy of the commons” where there is a conflict between individual and collective interests. The extant literature has provided some solutions to such a dilemma (Cabrera, & Cabrera, 2002; Kerr, 1992). Prior research has emphasized the roles of motivation in shaping the process of team contribution (Wasko & Faraj, 2000; 2005). However, precisely how a change in an individual-level pay-off structure affects motivation in a team project remains unclear. Peer assessment refers to “an arrangement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status” (Topping, 1998, p.250). Although educational scholars have proved that peer assessment is a better alternative in evaluating the relative contribution of individuals to a team project (Conway, et al, 1993; Hayes, et al, 2003), researchers only test the effect of peer assessment on a limited number of psychological characteristics such as perceived fairness of evaluations and satisfaction with teamwork (Conway, et al., 1993; Gatfield, 1999); they fail to explain how peer assessment influences students’ motivations and behavioral intentions to contribute to a team project (Topping, 1998). Network theorists have confirmed that the properties of embedded social networks constrain social behaviors (e.g. Granovetter, 1973). Recently, empirical studies have begun to examine how network characteristics such as social network density work at a psychological level (e.g. Sohn, 2009). However, the psychological mechanisms underlying the structural effects in teamwork are still unclear, making it difficult to systematically understand why some individuals are more likely to be free riders than others. Against this background, this study focuses on the process by which the inclusion of peer assessments and motivational factors interact with average tie strength with teammates in influencing what

kinds of attitudes teammates adopt in deciding how they are going to contribute. This study used a 2 x 2 between-subject factorial design to examine the mechanism of formation of intention to contribute in teamwork. A sample of 120 undergraduate students at a large university in eastern China participated in the experiment in the fall of 2015. The results show that there is a positive relationship between extrinsic motivation and intention to contribute. Contrary to our expectation, the inclusion of peer assessments results in decreased anticipated reputation building. The moderated mediation hypothesis also receives empirical support. Average tie strength with teammates moderates the impact of peer assessment on extrinsic motivation to contribute in teamwork, such that familiar ties compensate the negative effects of peer assessment on anticipated reputation building and anticipated tangible returns.

Alternative estimation methods for identifying contagion effects using longitudinal social network data

Ran Xu (Michigan State University)

Contagion effects, also known as peer effects or social influence process, refer to the phenomenon that people tend to assimilate behavior of those with whom they have interaction in a social network. With the availability of longitudinal social network data, studies of contagion effects have become more and more central to social science, with many applications in field of education such as diffusion of innovation, change of health behaviors or academic outcomes among adolescents, implementation of practices among teachers (Valente 1995, 1996; Christakis et al 2007, 2008; Sacerdote 2000; Frank et al 2004) among others.

However, these types of contagion effects are usually difficult to identify, as it's difficult to separate influence from other processes in the network, such as selection (homophily) process (Lazarsfeld and Merton 1954; Byrne 1971; McPherson and Smith-Lovin 1987; McPherson, Smith-Lovin, and Cook 2001) that actors seek similar others to interact; or individual preference for same social setting that people with prior similarity select themselves into same social setting, and actual friendship formation just reflects the opportunity of meeting in this social setting (FELD 1981, 1982; KALMIJN & FLAP 2001).

We argue that the difficulty of identification caused by entanglement between contagion effects and other factors can essentially be framed as an omitted variable bias problem. For example the entanglement between contagion effects and confounding variables (social settings, ego's and alter's attributes for example) can be easily framed as an omitted variable bias problem. And dilemma caused by co-evolution of influence and selection process can also be framed as an omitted variable bias problem. As pointed out by Steglich (2010), one of the important concern for SIENA is "possibility that there may be non-observed variables codetermining the probabilities of change in network and/or behavior". And Shalizi (2011) has shown that when there's latent trait that codetermine both influence and selection in network data, contagion effects are generally unidentifiable, mainly due to the fact that contagion and homophily (selection) are generically confounded through this latent trait. However, most currently available methods (SIENA (Snijder et al 2007), instrumental variable methods (Bramouille et al. 2009; An 2011), Propensity score matching (Aral et al 2009) etc.) either don't deal with this problem or require strong assumptions.

In this paper we propose several alternative estimation methods for identifying contagion effects that are inherently designed to deal with omitted variable problem. Specifically we focus on: (1) GMM-IV estimator that utilizes dynamic nature of the data and use past outcomes as instruments; (2) Structural equation modeling approach that models omitted variable as latent construct; (3) Adjusted latent-space modeling approach that incorporates individual's latent social positions when estimating contagion effects. Initial findings from simulation experiments suggest that all three estimators exhibit good properties in terms of producing small bias when recovering true coefficients of contagion effects, while GMM-IV estimators produce largest standard errors and are least stable when we have few time points. Together these estimators provide plausible alternatives for identifying contagion effects under various scenarios.

Using Artificial Intelligence Techniques to Design Peer Led Interventions

Amulya Yadav (University of Southern California), Leandro Soriano Marcolino (University of Southern California), Eric Rice (University of Southern California), Robin Petering (USC School of Social Work), Milind Tambe (University of Southern California)

Homeless youth are highly susceptible to HIV infection because of their indulgence in high risk behaviors, such as unprotected sex and needle sharing. In order to prevent the spread of HIV among homeless youth, many non-profit

agencies run intervention programs to raise awareness about HIV prevention and treatment practices. A small number of homeless youth are called in these intervention programs and are trained as peer leaders, where they are given information and resources about HIV. These peer leaders are encouraged to spread HIV related information among people in their social circles. These peer-led programs pose a key algorithmic question: How to decide which youth are trained as peer leaders? Intuitively, youth with the most influencing power should be selected as peer leaders. In the past, most agencies used network centric measures like degree and betweenness centrality to pick peer leaders for maximizing influence. Such techniques fail to account for the fact that in most real-world networks, the most central nodes are usually connected to each other. Moreover, these techniques do not handle uncertainty in network structure. This is a big concern as the exact structure of homeless youth social networks is rarely known. Thus, influence maximizing algorithms and techniques which carefully reason about uncertainties in network structure are needed. In this work, we use techniques from artificial intelligence to develop PSINET, a decision support system which aids agency officials in choosing peer leaders. PSINET handles uncertainties in network structure and evolving network state by casting the entire problem as a Partially Observable Markov Decision Process (POMDP). PSINET uses Monte Carlo simulations to evaluate every possible future network scenario to find out the most promising action at this time step. Our simulations show that PSINET outperforms other influence maximization techniques significantly. On real world network data collected from homeless youth, PSINET is able to achieve ~60% more influence spread than state-of-the-art influence maximizing solutions. PSINET allows for the selection of peer leaders from a diversity of network positions, while contending with a large amount of uncertainty in the network structure. These results show the promise of artificial intelligence techniques in solving problems in the field of social networks.

Multi-Agent Agency Network Reticulation

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Theories of Social and Communication Networks have advanced our understanding of social networks with the drivers of social ties such as homophily, exchange, and balance. However one of the factors missing from the picture is agency, especially individual agency. Individual agency has richness and impact beyond a simple node in a social network. A person could act as an agent of change affecting greater networks. Rather than the drivers for social and communication networks, we focus on agency. The agency ties and organizes together in an ideally optimal way the drivers for the formation, maintenance, and dissolution of social and communication networks. A person who needs to make life-impacting decisions about who to talk to, what to do, etc. is influenced by own preferential principles for networking and decision making will integrate in a specific way homophily, risk attitudes, exchange, opposition moves, balance, time constraints, coevolution, financial constraints, and/or other relevant factors in making a decision and act as a unique agency. Agency affects networks and networks contextually impact agency—ego-networks hint about agency characteristics.

We report progress on building an agency-focused agent-model of network reticulation, extending the Reticulation Theory that integrated activity and networks and elucidated the nature and connections among enactment, activation, and reticulation in structuring networks, forming coding conventions, and manifesting foci of activities. The agency is modeled by treating network nodes as agents with their own individual motives and networking tendencies rather than treating actors as belonging to simple classes. An agent in a network each has its own goals, roles, time, beliefs, tasks, task structures, plans, communication, performance measures, activities related to tasks, enactments related to goals and events, reticulation related to communication, among other factors. The agent has potentially conflicting information and situations, and has to obtain situation awareness and construct a common operating picture. At the heart of the decision making processes of an agent, we have traces and workflows of how a decision is made based on the above factors, and of how a common operating picture is constructed. Examining these traces and workflows for significant graphs, a decision model is generated. Additionally, decision making meta-model algorithms learns from prior action outcomes. We use Red-Blue IED Game and its gameplays by human players to inform and instantiate our model. The game simulates the battle for hearts and minds of a village between friendly (Blue) team with agents such as commander, patrol, aid convoy, and enemy (Red) team with bombmaker, digger, financier agents. The Blue team clears the roads of bombs and enemies to provide villagers with security and aid, while the Red team finances and plants bombs to hinder the Blue team.

We aim to build an integrative theory of network structuration through multi-agent agency network modeling. Each agent acts based upon own agency with consideration for the preferential principles for networking and decision making. Homophily, balance, exchange, etc. are integrated and reasoned with to infer agent decisions, as well as are other factors such as agent's roles, needs, constraints, and experience.

International Refugee Crisis and the Evolution of INGO Network: From 2002 to 2016

Aimei Yang (University of Southern California), Rong Wang (University of Southern California)

Since 2010, European countries have seen a steady increase of asylum applications and illegal border crossing immigrants. The number reached a historical high in 2014 and eventually escalated into a major humanitarian crisis in 2015. In 2015, more than one million refugees crossed into the European Union to seek asylum. The large influx of refugees overwhelmed many governments. Worldwide, other countries such as the U.S also experienced an increase in the number of refugees. In response to this humanitarian crisis, many INGOs working on refugee resettlement have built alliances to facilitate the resettlement of refugees and crisis relief. In this article, we focus on the evolution of the alliance network among refugee INGOs. This article draws upon organizational ecology theory as an important theoretical framework (Aldrich & Ruef, 2006; Hannan, & Freeman, 1977). Organizational ecology theory studies the formation, growth, survival and death of organizations and the relationship networks among them (Monge et al., 2011). An important concept in organizational ecology theory is the idea of resource niche, which refers to a finite resource that can support a limited population density and a finite number of relationship ties. A population of organizations, such as INGOs specialize in refugee relief, depends on the same resource niche and their relationships can range from cooperative to competitive. Resource niche is an important concept because the size of resource niche affects the density of organizational population and also sets the upper bound of relationship ties (Carroll, 1988; Monge, Heiss, & Margolin, 2008). Since Hannan and Freeman's (1977) seminal article, organizational ecologists have argued that organization population change is not a process purely determined by organizations' internal characteristics. The refugee INGOs population and the recent refugee crisis present an important opportunity for examining the evolution of alliance formation. First, given these INGOs' mission in refugee resettlement relief, they represent a well-defined population of organizations and alliance among these INGOs has evolved over time, thus allows for the empirical testing of the theory. Second, the traditional idea of resource niche highlights the impact of available resources, but rarely discusses the influence of societal needs, public opinion, and crises. In fact, NGOs represent a unique population of organizations that are often organized around social issues and problems (Yang, 2012). While on the one hand resources definitely affect NGOs' population density and alliance network structures, there are likely other factors shaping the evolution of these networks. Indeed, as Carroll (1988) noted "political, social, cultural, and institutional criteria can account for many selection processes among organizations" (p. 3). In the current study, we explore the impact of financial resource such as international donations and foreign aid. At the same time, we examine the influence of other factors such as the severity of refugee crisis, public attention and opinion. We further test our hypotheses using SIENA (Snijders et al., 2007) on four waves of data collected from 2002, 2007, 2012 and 2016. Findings of this study will contribute valuable insights to expand organizational ecology theory and deepen our understanding of NGOs.

ClickDiary: Online Tracking of Health Behaviors and Mood

Tso-Jung Yen (Institute of Statistical Science, Academia Sinica)

Traditional studies of health behaviors are typically conducted using one-shot, cross-sectional surveys. Thus, participants' recall bias may undermine the reliability and validity of the data. To capture mood changes and health behaviors in everyday life, we designed an online survey platform, ClickDiary, which helped collect more complete information for comprehensive data analyses. We aim to understand whether daily mood changes are related to one's personal characteristics, demographic factors, and daily health behaviors. The ClickDiary program uses a Web-based platform to collect data on participants' health behaviors and their social-contact networks. The name ClickDiary comes from the platform's interface, which is designed to allow the users to respond to most of the survey questions simply by clicking on the options provided. Participants were recruited from the general population and came from various backgrounds. To keep the participants motivated and interested, the ClickDiary program included a random drawing for rewards. We used descriptive statistics and the multilevel proportional-odds mixed model for our analysis. We selected 130 participants who had completed at least 30 days of ClickDiary entries from May 1 to October 31, 2014 as our sample for the study. According to the results of the multilevel proportional-odds mixed model, a person

tended to be in a better mood on a given day if he or she ate more fruits and vegetables, took in more sugary drinks, ate more fried foods, showed no cold symptoms, slept better, exercised longer, and traveled farther away from home. In addition, participants were generally in a better mood during the weekend than on weekdays.

How Social media companies perceive and corporate with Internet of Things

Minju Yoo (Sungkyunkwan University), Jang Hyun Kim (Sungkyunkwan University), Kang-Nyeon Lee (Sungkyunkwan University)

Social media companies have been highly interested in Internet of Things(IoT) recently. They are trying to figure out what is the key technology to combine and interconnect between social media and IoT. For example, Facebook, which is the one of giant social media companies, starts to imagine the caring the user's garage or home appliances via Facebook platform. Also, TenCent, which provides popular mobile social messaging application WeChat, works related to IoT cloud provider using API for smart hardware. For the comparative study, authors chose top 10 social media companies and collect the data from social media companies' social media channel including twitter and facebook. From the data collection, authors analyze that how social media companies perceive and corporate with Internet of Things via their social media channel. Semantic network analysis and social network analysis are employed for this research. Relevant software including NodeXL, UCINET, Wordij, and others are used for the analysis.

Exploring Substance Use and Network Composition of Homeless Youth with and without a History of Foster Care

Amanda Yoshioka-Maxwell (University of Southern California), Eric Rice (University of Southern California)

Background: Homeless youth suffer from a wide range of risk factors that impact the length and quality of their lives. As many as 40% of all homeless youth report a history of foster care and emerging research suggests behavioral health differences between youth with and without such histories. While the literature has established higher methamphetamine use among homeless former foster youth, factors impacting this outcome have remained unclear. This study aims to explore network composition and differences that may exist in homeless youth networks where foster care experience and high methamphetamine use are concerned. Methods: The YouthNet data set was used for this analysis, comprised of a community-based sample of 652 homeless youth ages 13-25 from two drop-in centers in Hollywood and Santa Monica, CA. A subset of this data was used for the current analysis, focusing on youth aged 18-25. Both egocentric and sociometric data were collected. All responses from the egocentric data were based on self-reports and included questions regarding foster care experience and recent methamphetamine. Exponential Random Graph Models (ERGM) were run in R to explore network properties and to determine if foster youth and youth using methamphetamines were independently disproportionately connected to one another. Results: Initial network analysis revealed that the network had very low density (.009), a low level of connectedness (.278), and transitivity of 11.01%. This network has a very low level of centralization (.0061), with 89 components, and a high proportion of fragmented pairs of nodes (.722). Results of the preliminary ERGMs indicate that fewer than half of the possible edges exist in this network ($\beta = -9.27$, S.E. = .046, $P < .001$), there was a tendency toward reciprocity, and a very slight tendency toward triangles ($\beta = .027$, $p < .001$). The test for homophily indicated that former foster youth significantly disproportionately congregate with other foster youth ($\beta = .268$, $p < .001$) while controlling for high methamphetamine use, while youth using high rates of methamphetamines do not significantly disproportionately congregate with one another when controlling for foster care experience. Discussion: This study has important implications for understanding network composition among homeless youth engaging in substance use. While prior literature has found that meth using youth tend to have meth using network ties, this study indicates that among homeless youth engaging in high rates of methamphetamine use, former foster youth are likely to connect to one another, regardless of their methamphetamine use, while homeless youth using high rates of methamphetamine are not significantly likely to group together. These networks only include youth who are a part of drop in center programs and not the larger world of social ties encountered by youth (e.g. case workers, using friends who are older). Foster care histories are shaping these service using social spaces, but not heavy meth use. Perhaps heavy meth using youth are connecting primarily to meth using peers outside this network space. Interventions aimed at promoting long-term behavioral health should focus on the unique network composition of former foster youth.

Trust in Prison: An Exponential Random Graph Analysis of Binary and Weighted Networks

Jacob Young (Arizona State University), David Schaefer (Arizona State University), Derek Kreager (Pennsylvania State University)

Research on trust relationships has shown discernible regularities in self-organizing network structure such as reciprocity and transitivity. However, little work has examined the role of trust in correctional institutions. Building on this research, we test mechanisms of trust production using complete network data from approximately 200 inmates held in a unit of a Midwestern medium-security men's prison. Drawing from work that conceptualizes trust as an investment, we hypothesize that the trust network will be characterized by reciprocity and closure. We also hypothesize that the trust network will be characterized by racial and religious homophily. We test these hypotheses using binary and weighted exponential random graph (ERG) models.

Accuracy of egos' report of alters' drug use: Feasibility of using behavioral data to help resolve duplicates in sociometric risk networks

April Young (University of Kentucky), Christopher Hopkins (Charles River Analytics), Abby Rudolph (Boston University), Jennifer Havens (University of Kentucky)

Background: The standard protocol for sociometric epidemiologic studies involves asking participants to give the names and basic demographic description (e.g., gender, age) of their partners, or alters. Analysts then cross reference these data with that of other participants to construct a network representing connections among all participants. This tie confirmation process, commonly referred to as 'duplicate removal' or 'entity resolution (ER),' is difficult. Due to ethical considerations, investigators are often limited in the amount of identifying information they can elicit from egos about their alters. While limitations are appropriate, decreased access to identifying information complicates the process of ER and could jeopardize the validity of the resulting sociometric network. Thus, more research is needed to investigate non-identifying information that may be helpful in the ER process. Using sociometric data from a sample of high-risk people who use drugs (PWUD), the current analysis examines how accurately egos report their alters' drug-related risk behavior and if accuracy is associated with individual- and relationship-level characteristics of participants and/or alters. The findings are important to understanding if, in network-based studies involving PWUD, investigators can reliably use the behavioral data they collect from egos about alters in the ER process.

Methods: Data were collected from 503 PWUD enrolled in a cohort study in the US. Network ties ($n=897$) involved recent (past 6 months) sex, drug co-usage, and/or exchange of social support. Participants provided alters' first names, last initials, ages, and information on a variety of relationship-level characteristics. To construct the sociometric network, age and name data were cross-referenced to other participants' data, and suspected ties were confirmed via consultation with interviewers. When a participant was confirmed to have named a partner who was also a participant, the accuracy of the reported drug-related behaviors (e.g., daily drug use, injection drug use, injection of prescription drugs, cocaine, heroin, and methamphetamine) could be determined by referencing it against alters' self-reported behavior. Ego-alter agreement was examined using Kappa statistics and binomial generalized estimating equations were used to determine correlates to accuracy.

Results: Overall, the reliability of egos' report of alters' drug-related behavior was fair to poor. Participants did not accurately report whether or not their alters used drugs daily ($\text{Kappa}=0.15$). Participants more accurately reported whether or not their alter injected drugs ($\text{Kappa}=0.44$); in 86% of relationships in which the ego reported that the alter injected, the alter self-reported injecting. In general, participants did not accurately report the specific type of drug that alters were injecting; reliability of report on injection of prescription drugs ($\text{Kappa}=0.45$), cocaine ($\text{Kappa}=0.21$), heroin ($\text{Kappa}=0.24$), and methamphetamine ($\text{Kappa}=0.08$) was moderate to low. Accurate reporting of alters' injection drug use was significantly more common in relationships in which the ego and alter were closer in age ($p=0.032$) and in cases in which the ego and alter used drugs together and shared drugs ($p<0.001$ and $p<0.001$, respectively).

Conclusions: In this study, egos did not accurately report their alters' drug-related behavior. These findings suggest that behavioral data may not be useful in the ER process in certain contexts.

The organization of sexual risk and protection in a digital social environment: A two-mode network analysis of HIV risk and protective factors and Facebook group memberships among a population sample of young Black men who have sex with men (YBMSM)

Lindsay E. Young (University of Chicago), Adam B. Jonas (University of Chicago), Stuart Michaels (University of Chicago), John A. Schneider (University of Chicago)

Although instances of new HIV infection have plateaued in the United States, new infections continue to rise within certain at-risk populations, in particular young Black men who have sex with men (YBMSM). In recognition that HIV risks and protections develop in larger social milieu, increased attention has been cast on the socio-structural environments in which YBMSM are embedded to better understand the pathways through which risks and protections are conferred. To date, these efforts focus primarily on the offline contexts in which YBMSM interact, for example social venues like clubs or bars or supportive structures like the House Ball Community (HBC). While offline environments are important, the prevalence and salience of social media platforms like Facebook warrant efforts to better understand how HIV risks and protections are organized in online social contexts.

To this end, we explore how risk and protective factors are organized around Facebook group associations among a population based sample of YBMSM, paying particular attention to how these factors accumulate differently around groups that offer members varying degrees of expressive privacy (i.e., public, closed, and secret groups). We draw from a respondent-driven sample of 525 YBMSM in South Chicago collected as part of the uConnect study. Survey-based interviews were conducted to collect a variety of individual and relational data relevant to sexual health behaviors. Additionally, an application was developed to collect portions of respondents' Facebook data, including Facebook groups. In total, 351 participants consented to the Facebook download, of which 302 (86%) were members of at least one Facebook group, yielding a sample of 4,476 Facebook groups.

Logistic regressions on self-reported Facebook use suggests that the YBMSM in our sample who report being members of Facebook groups are more likely to have had a recent HIV positive partner and to have used sex drugs compared to their non-group member counterparts. And in terms of HIV protection, self-reported group members were more likely to have heard of PrEP, to have had participated in an HIV prevention program, and to have had a recent consultation with an HIV outreach worker. They were also more likely to have positive identity-affirming beliefs that protect them from common stigmas associated with being Black and gay.

To unpack the degree to which these same risk and protective factors motivate the observed Facebook group associations of YBMSM, while accounting for the inherent interdependencies in the data, we will present the results of a series of two-mode ERGMs on the YBMSM-Facebook group membership network. In so doing, we aim to show how HIV risks and protections are conferred through the localized patterns of group associations amongst YBMSM.

Together, these analyses will enhance our understanding of the risk and protective potentials of online group environments and will provide interventionists with insights for how best to leverage online social media such as Facebook to speed the diffusion of information about the prevention of HIV and curb rates of new infection in the YBMSM community.

Quantitative social network analysis through a qualitative lens; an analysis of subjectivity in exploratory analysis and stochastic models of networks

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Background: A quantitative approach to social network analysis generally involves the application of sophisticated mathematical and statistical concepts and techniques and complex graphical presentation of networks. This reliance on mathematical models and methods has been growing by the development of stochastic models of network structure and dynamics. Nonetheless, subjectivity is an integral aspect of network analysis, and is manifested throughout the analysis and interpretation of the findings, while being overlooked by many quantitative researchers. In this study, we used a qualitative lens to reassess our journey in the realm of quantitative network analysis. Original study: The staff of three public health units in Ontario, Canada participated in three online surveys (at baseline and two annual follow-ups) before and after a 22-month intervention through which a selection of staff engaged in Knowledge Broker-led workshops and development of evidence summaries to address local public health problems. The respondents provided the names of peers to whom they turned to seek information, whom they considered as experts, and their friends. We used descriptive network analysis techniques and sociograms to depict the baseline structure of information seeking networks in three health units. We also used stochastic actor-oriented modeling to study the evolution in the tendency of staff to select information sources through time, predicted by the engagement in the intervention, behavior scores,

organizational divisions, and structural dynamics of social networks. Qualitative post-hoc analysis: We performed a thematic framework analysis on the analysis reports and resulting manuscripts of the original quantitative study. We annotated the texts by identifying the phrases that involved subjectivity in choice of the techniques and concepts, translation of numerical results into narrative explanations (qualitization), and higher level interpretation of findings in relation to the context and hypotheses. We developed thematic frameworks of the manifestations of subjectivity in an exploratory network analysis and a stochastic model of network evolution. Results: Subjective decisions were made at various stages of the quantitative studies. They included the attribution of meanings to social relations (e.g. the meaning of advice seeking in a health department) and network positions (e.g. being a network broker), interpretation of structural indices (e.g. the concept of transitivity) and graphical patterns (e.g. resemblance to a star-shaped network or the boundaries around clusters), making sense of multiple measures for complex social constructs (e.g. various measures of network centrality), labeling the individuals and groups based on the analysis findings (e.g. actors who changed their behavior or formed a cluster), attributing the results of sophisticated models to alternative hypotheses (e.g. the dilemma of social selection vs. social influence vs. the common context in longitudinal networks changes), comparison of social groups (e.g. comparing the findings among public health units), generalizability of average measures to subgroups (e.g. assuming the networks as homogeneous), and interpreting the findings in micro and macro level context. We provided recommendations for increasing the rigor of narrative reporting and interpretation of quantitative network analysis.

Network and Individual Factors Associated with Drug Use among Female Sex Workers (FSWs) in China

Yeon Jung Yu (University of South Carolina), Christopher McCarty (University of Florida), Bo Wang (Wayne State University School of Medicine)

Research on women who engage in both drug use and sex work has been limited, as most previous studies have focused on these risk behaviors separately. The current study examines the network properties as well as the demographic and behavioral factors associated with drug use among female sex workers (FSWs) in southern China. We collected survey data (n=175) in the Hainan province during our 26 months of ethnographic fieldwork in China. Our analyses included Fisher's exact chi-square tests, independent-samples t-tests, Mann-Whitney U, binary logistic regression (LR), as well as ethnographic data analysis. Multivariate analysis showed that women of a younger age, being single, with more education, and a higher income were more likely to use drugs. Pertaining to network properties, FSWs with a lower percentage of clients and men in ego networks were more likely to use drugs; this would imply a mechanism by which drug-using FSWs are more at risk, as the women take a greater number of transient clients. In addition, FSWs who were influential network members (i.e., higher betweenness centrality) and were closely related to other network members (i.e., higher closeness centrality) were more likely to use drugs; this may suggest that drug use is a means of sustaining the high functionality of the workers. Our qualitative data also showed that club drug use was easily accessible in entertainment venues and was often a means of socialization in FSW communities. Network characteristics correlated to HIV-related risks among FSWs should be further examined in future studies.

Multiplex networks and individual outcomes in large scale scientific work

Andrew Yu (Michigan State University), Ralph Heidl (University of Oregon), John Hollenbeck (Michigan State University), Michael Howe (Iowa State University)

Modern scientific discovery has increasingly relied on large-scale collaborative efforts. Such projects pose significant organizational challenges related to the exchange of complex knowledge between scientists and non-scientists. While the scope of these efforts often require the establishment of formal knowledge exchanges, the complex nature of the innovation process calls for the flexibility of emergent informal knowledge exchange. Existing research has long recognized both the importance of formal and informal relationships, and much of the research on interpersonal relational networks within organizations has emphasized the importance of informal networks and the role that they play in contributing towards information exchanges, creativity, and innovative outcomes. Yet, organizational research has been relatively sparse in examining how the interplay between the designed formal structure and the emergent informal network structures can help or hinder these outcomes.

Recent research has only begun to examine how elements of the formal organizational network can affect the propensity of individuals to exchange information. For instance, Caimo & Lomi (2015) took a dyadic perspective and showed

that information exchanges are unlikely to boundary span across organizational subunits, unless the interaction occurs between individuals who have both a formal hierarchical and an informal exchange relationship. Aalbers, et al. (2014) found evidence that overlapping formal and informal ties create a richer medium for information exchange, controlling for the strength of the relationships. These studies suggest that in addition to the informal network structure within an organization, the prescribed formal structure can have incremental and predictive validity on important outcomes.

We add to this line of inquiry by considering how the formal structure and the underlying informal network can affect individual performance. Specifically, we examine the effect of an individuals' propensity of giving and receiving advice along prescribed formal channels can impact their performance. Furthermore, we investigate the moderating effect the collaborative intensity associated with different task portfolios. The empirical setting of our study is an ongoing large scale project in the area of high-particle physics. We collected field data from a national-user facility that houses scientific, administrative, and support divisions. Our data includes traditional sociometric surveys, time-lagged supervisor reports, as well as archival sources.

We find that the number of formal ties an individual leverages for advice exchanges is positively related to performance. Our results also suggest that this relationship is moderated by whether an individual works within a collaborative environment, such that the positive relationship was strengthened for individuals working in collaborative settings and the relationship was negative for those that did not. These results contribute to the limited, but growing, body of research seeking to examine how the formal organizational structure and the informal network can help or hinder performance.

Influence Maximization Based on Partial Network Structure Information: A Comparative Analysis on Seed Selection Heuristics

Gönenç Yücel (Boğaziçi University), Şirag Erkol (Boğaziçi University)

Understanding the dynamics of influence over social networks, and developing methods for identifying most influential nodes (seed selection) is of primary importance in various contexts such as viral marketing, (mis)information diffusion, and vaccination strategies against pandemics. Seed selection is predominantly treated as an optimization problem; i.e. influence maximization. Finding the best set of nodes that would yield the maximum influence spread is indeed an optimization problem in nature, but it demands perfect information about the structure of the network being studied. Even if the complete structure of a network is known, solving the aforementioned optimization problem is notoriously difficult, as it is shown to be a NP-hard problem. In that respect, relatively simple seed selection heuristics that do not require complete network structure, and are computationally cheap can prove very useful in various contexts, if they can be shown to perform significantly better than a randomly selected seed set. This paper reports the preliminary findings of an ongoing study that aims analyzing such heuristics.

Broadly speaking, this is an experimental study that relies on synthetic diffusion experiments conducted on an influence-spread simulator. The simulator is an agent-based simulation model, which is capable of initializing different network types, and of simulating different diffusion processes. We consider three classes of networks; which are random, small-world, and scale-free networks. Regarding diffusion processes, we simulate both push type (i.e. independent cascade) and pull type (i.e. linear threshold) processes. In this study, an experiment class is defined as the combination of a network type and a diffusion process (e.g. Independent cascade on random network). There are a total of six experiment classes, and for each experiment class, a large set of instances is created that differ mainly in the characteristics of the network. For the independent cascade-random network class, this translates into creating numerous random networks with different average node degree and number of nodes. For small-world based classes, the networks differ mainly in clustering coefficients and average distances. A given seed selection heuristic is used to identify initial influence seeds for each of these instances. If the heuristic is probabilistic in nature (if it has some randomness in selection), the seed selection is replicated numerous times on the same experiment instance. This experimentation enables us to compare the average performance of various seed selection heuristics over different network types, different diffusion processes, as well as different network characteristics.

At this stage of the study, we experiment with basic seed selection heuristics from the literature that are based on alternative types of centrality measures (e.g. degree centrality, degree discount, etc.). The performances of these heuristics are compared against random seed selection. The preliminary results suggest that different networks demand different selection heuristics, as expected. However, the good news is that a good seed selection heuristic for a certain

network type outperforms others over a range of instances of the same network class. Based on insights developed during these first round of experiments, we also propose novel seed selection heuristics for a given network type.

Latent space model for community detection based on information cascades

Igor Zakhlebin (Higher School of Economics, Moscow), Aleksandr Semenov (Higher School of Economics, Moscow)

There is a large body of work on community detection in social networks. Discovering communities allows to separate the network's actors into homogeneous groups, thus simplifying its structure and making it easier to comprehend. Community detection has been used for many purposes, e.g. to detect political polarization in the blogosphere, determine ideological affiliation of social network's users and inferring cultural preferences in food based on recipe data, to name just a few. And with recent changes in data source availability (like Facebook and Twitter restricting access to their social graphs), it becomes increasingly more relevant to analyze information cascades in those networks (like post shares, retweets and replies).

A number of successful approaches to non-overlapping community detection has been developed over the last two decades, and became widely popular. However, to address such issues as scalability to large networks and ability to detect massively overlapping communities, a number of methods based on latent space models have recently emerged. These models are simple, mathematically principled, and naturally allow to model overlapping communities. However, there wasn't a latent space model that would allow to describe information cascades.

The information cascades have significantly different structure than networks comprising social ties. Traditionally, network communities are thought of as groups of actors that are more densely connected to each other than to the rest of the network. But in information cascades, behavior of actors differs significantly depending on their network centrality, effectively placing them on a scale from "top" to "ordinary" ones. We notice that messages are distributed in a star-like fashion (with negligible exceptions), originating from the top actors, and distributed by less central ones. So we put forward the definition of communities as groups of actors who reply or share the messages of similar "top" actors among them, and define the similarity of "top" actors through intersection of their audiences.

Building on existing BigCLAM (Cluster Affiliation Model for Big Networks) and CoDA (Communities through Directed Affiliation) models, we propose the latent space model that jointly accounts for the actors' community affiliations and their centralities. It allows to describe cohesive and 2-mode communities, as well as communities having arbitrary number of hierarchy levels. Unlike most previous works, the model can be fitted to both directed and undirected networks, while having a relatively small number of latent variables. We also describe the procedure to fit it to actual networks and estimate its efficiency based on several real world examples.

Toward an integrated Social Exchange Theory of Advice Relations in Organizations

Paola Zappa (University of Lugano), Alessandro Lomi (University of Lugano)

What motivates organizational members to seek and give advice, contributing to informal knowledge transfer and sharing in organizational settings? The answer provided to this question by extant literature seems not completely satisfactory. The prevalent view applies social exchange theory to argue that organizational members try to exchange status recognition for advice. Accordingly, they are likely to select advisors based on their status, building non-mutual advice relations. Although strongly supported, this view seems to contrast with some empirical evidence, which points to an alternative perspective. This argues that advice seeking relies on interpersonal trust due to co-working relations or similarity in respect to individual characteristics.

To advance our understanding of advice seeking and giving in organizational settings we propose an integrated view of social exchange theory, which accounts for the two perspectives. We test the hypothesis that advice relations are shaped differently by the presence of the formal organizational structure, which embeds them in hierarchical ordering of various strength. This implies that advice is exchanged with different rewards.

Empirical analysis of advice seeking ties among the 120 members of a multiunit organization provides support to the coexistence of the two perspectives. Results indicate that advice relations between members of the same organizational subunits are shaped by a strong hierarchical ordering. Advice is likely to be exchanged with status recognition, either emergent or exogenous, and advice seeking relations are likely to be non-mutual. When linking

organizational members connected by co-working relations across subunit boundaries, advice seeking relations are shaped by interpersonal trust. Advice is likely to be exchanged with advice, and advice seeking relations are likely to be mutual. In no circumstances, expertise matters as a criterion for selecting advisors.

Network-Based Modeling for HCV in US Drug Injectors: Treatment as Prevention

Alexei Zelenev (Yale School of Medicine), Jianghong Li (Institute for Community Research), Frederick Altice (Yale School of Medicine)

Introduction: Hepatitis C virus (HCV) and HIV infection are the two most prevalent chronic viral infections globally (170 and 34 million, respectively) and in the U.S. (5.2 and 1.2 million), respectively, with HCV prevalence estimated as high as 80.8% among HIV+ people who inject drugs (PWID). Few analyses using social network analysis have modeled an injection network of PWID in order to understand HCV and HIV transmission and evaluate the effectiveness of various HCV treatment as prevention (TasP) in US PWIDs.

Methods: A network model was first developed and calibrated using 'empirical' data collected from 3102 PWID and their injection partners in Hartford, Connecticut; 1357 were excluded because they had no reported injection ties within the network. Graph models were fit to real injection network data, and synthetic networks were generated that were statistically similar to the observed original injection partnerships. A dynamic HCV transmission model using a combination of the selected network model and agent-based micro-interactions was simulated in order to evaluate the effectiveness of four potential TasP strategies on chronic HCV prevalence and incidence over a 10 year period.

Results: Exponential Random Graph Models were found to fit the collected data reasonably relative to Preferential Attachment and Small World models. We found that expansion of coverage was the key to reducing HCV prevalence over 10 years. We also found that level of necessary coverage is sensitive to the dynamic elements of the network and the rate of turnover among injection partners.

Conclusion: Mathematical modeling using injection network data provides important information about how to intervene most effectively for TasP strategies in PWIDs.

Modeling rumor diffusion on social media during crisis events

Li Zeng (Information School, University of Washington), Kate Starbird (Human Centered Design & Engineering, University of Washington), Emma S. Spiro (Information School, University of Washington)

During natural disasters and other crisis events, unsubstantiated stories (i.e. rumors) often proliferate as a result of collective sense-making processes. Key to this process is the retransmission of information from one individual to the next. Today, this diffusion process is likely to occur online via social media and online social networks. Previous research has observed that crisis-related content is associated with increases in the public's retransmission response speed on Twitter, when compared with random content. Moreover, the average retransmission rate of a message varies by the content's expressed stance towards the rumor (i.e. affirming or denying rumor claims). To better understand crisis-related rumoring behaviors and their implications for information diffusion, we perform a network simulation study to capture the dynamics of rumor propagation, studying how the diffusion process of crisis-related rumors may unfold in online networks. Our diffusion model is informed by prior studies of retransmission of rumors on Twitter, allowing us to parametrize the diffusion model to mimic empirical observations of rumoring online. We consider several network structures (e.g. small-world networks, scale-free networks, etc.), as well as networks generated to resemble social media networks, in the study. We compare the speed and reach of the simulated rumor diffusion process, noting differences in these characteristics between rumor-affirming versus rumoring-denying messages. Finally, we discuss the implications of these results for crisis response and recovery.

neural signatures of social valuation predict future liking

Noam Zerubavel (Columbia University), Mark Hoffman (Columbia University), Adam Reich (Columbia University), Peter Bearman (Columbia University)

Since the emergence of sociometric research and social network analysis, social scientists have sought to understand the determinants of interpersonal attraction and predict how liking ties evolve within a network structure. Here we advance a novel paradigm that combines functional neuroimaging and social network data collected in a longitudinal

context to identify the neural signatures of future liking. We hypothesized that fMRI data could be leveraged to better predict how new group members' liking ties would develop over the course of an intensive summer program. The study population consisted of 20 students who volunteered to spend nine weeks together in small teams to organize Walmart workers. At the start of the program, participants viewed faces of every other group member while whole-brain fMRI data were collected (following the neuroimaging paradigm described in Zerubavel et al, PNAS 2015). These neuroimaging data were analyzed against social network data (collected when the program began, throughout the summer, and after the program concluded) as well as individual node-level attributes (e.g., various demographic and personality variables).

We identify neural signatures of future liking in the brain's core system for interpersonal valuation (i.e., processing social reward and evaluating others' motivational significance). Greater neural activity in these social valuation regions while ego viewed alter at the beginning of the program predicted their ultimate liking upon completing the program, even when controlling for initial liking and other potential predictors of affiliation (including demographic and personality attributes of ego and alter, as well as homophily on these characteristics). Critically, we found that these neural signatures of future liking were not associated with initial liking at the beginning of the program.

These data offer new insights into how liking ties form and shape groups' affiliative network structure. More broadly, this paper represents the second in a series of papers exploring the intersection of social and neural networks. The interdisciplinary framework we advance integrates theories and methods from sociology, social psychology, and cognitive neuroscience.

Bibliometric Traits of Social Network Analysis Field

Guodong Zhang (Nankai University), Wanli Zhao (Nankai University), Zhizhang Wang (Southwest university)

Abstract: Social network analysis (SNA) is a important sociology method originally used by many subjects with many applications, which forming a special research field. Its global literature increased fast in recent years. In this work, bibliometric analysis and knowledge domains mapping technology were used to picture global scientific production and developing traits of SNA field. The data were collected from 1985 to 2015 from the Science Citation Index database, Conference Proceeding Citation Science Citation Index database and Social Science Citation database, Conference Proceeding Citation Social Science Human database integrated by Thomson Reuters. The published papers from different subjects, journals, authors, countries and keywords distributed in several aspects of discipline put that SNA research increased rapidly over past 20 years and boomed in recent 5 years. The distinctions in knowledge map show that the clusters distributed regularly in keywords due to the information science research rapidly development. The analytical results provided several key findings of bibliometrics traits.

Inferring Urban Activity Distribution from Aggregated Egocentric Communication Data

Xuhong Zhang (University of California, Irvine), Carter Butts (University of California, Irvine)

The urban environment constitutes a complex "ecology" of groups, organizations, and institutions, each element of which influences the social interactions of its associated individuals. While detailed network data at the individual level can potentially shed light on this urban ecology, such data is rarely available; however, aggregated egocentric information on communication patterns obtained e.g. from cellular providers is increasingly common. Such data is often temporally and spatially well-resolved, but does not allow for the identification of ties between specific pairs of individuals. Despite these limitations, this "slice" through the dynamic communication network of an urban population contains a wealth of information on the activities of its members. Here, we show how a novel spectral regression approach can be employed to infer the spatio-temporal distribution of activities within an urban area from aggregated egocentric communication data. We apply this approach to data from two European cities, showing improvements versus state of the art for prediction both within and across urban environments. Extensions to less aggregated data (where available) are also discussed.

The characters of keywords network structure in the field of SNA

Guodong Zhang (Nankai University), Wanli Zhao (Nankai University), Yiqun Li (Nankai University)

Researcher target: In this paper, we will illustrate some traits during the development of SNA via the study keywords structure. Which themes were the active sub-groups base on different periods time, What are the subgroups consist of the SNA field, and which sub-theme is the best Hotpoint in the whole SNA field.

Data collecting: All the data was collected on October 27, 2015 from the web of science, searching condition is the theme= "social network* analysis"(1985-2015.10). 3965 articles were collected, and then author's keywords were extracted, forming co-occurrence matrix. The first 100 high frequency co-occurrence matrix was used to form keywords network according to different periods.

Methods: Centrality Index and finding the sub-groups were measured by using UCINET6 and Netdraw.

Network Interventions for Managing the Diffusion of Health Beliefs

Jun Zhao (University of Georgia), Dawn T Robinson (University of Georgia)

The scientific consensus among researchers in universities and major government agencies (the CDC, American Academy of Pediatrics, and the World Health Organization) is that there is no evidence causally relating childhood vaccination to neurodevelopmental disorder such as autism. Yet, many people remain unconvinced. Previous studies have argued that peer influence, low trust in science, and the ubiquity of social media may all contribute to the spread of vaccination fears among people who rely heavily on information from user-generated content and peer input. In this project, we attempt to disentangle the puzzle from network perspective by investigating how the structure of social networks may condition information selection and distortion during network diffusion. Drawing insights from three streams of research: the structure of common speech activity, content features shaping the cultural transmission of messages, and the difference between simple and complex contagions within networks, we develop a new theoretical model that addresses the complexity of propagating positive information. We argue that the successful transmission of health beliefs depends largely upon two structural constraints embedded in social networks: the structural location of valid source and network typology, which interact with features of the message to condition likelihood of diffusion. Past research has shown that, compared to positive beliefs, negative evaluation are less likely to be challenged and thus more likely to be passed along and expanded in group settings (Eder and Enke 1991). Therefore, when initial negative evaluation of health behaviors receives immediate supportive response from relational partners, given tendencies toward consensus and negative evaluation in communication, a cascading effect would quickly follow resulting in contagion of strong disbelief. However, challenges made by valid sources immediately after the initial negative evaluation, can interfere with such cascades. Once the negative cascade has been slowed, we expect that we expect networks with higher level of clustering (i.e. wider bridges) will further facilitate the spread of complex contagion of health behaviors, given recent studies that demonstrate certain social behaviors like protest participation require social confirmation from multiple sources (i.e., social reinforcement from multiple channels across network) (Centola 2010; Centola and Macy 2007). We demonstrate the implications of our model using a series of computer simulations using NetSim package in R. Network typology and structural locations of intervention sources are manipulated. We find under this model that (1) without any intervention, negative information will be more likely than positive information to be diffused within networks; and (2) when challenges from credited source are implemented at earlier stage of transmission, networks with higher levels of clustering will be more likely to propagate positive ideas about health behaviors. After demonstrating the basic implications of these arguments for networks of different forms, and messages beginning in different locations, we investigate the types of network interventions that would be expected to be effective (and those that would not) for increasing the spread of valid information in the network. We conduct a second series of simulations that implement these intervention strategies and analyze the consequences for the spread/containment of health beliefs.

Network Analysis of Communications and Connections of Engineering Professional Skills through Group Discussion

Mengxiao Zhu (Educational Testing Service), Mo Zhang (Educational Testing Service)

This study uses network models and social network analysis measures to analyze the communication processes and the integration of the engineering professional skills (EPSs, e.g., ethnics, environmental impacts of an engineering solution) during the student-group discussions. Traditionally, communication and other "soft" skills are assessed holistically, meaning that the graders assign a final score based on their overall evaluation of the student performance represented through the whole discussion session. In contrast to one or several static scores, this study proposes a

network analysis approach, which can capture the dynamics of the communication throughout the student discussion session, the longitudinal trend of those dynamics, as well as the strength and pattern of the connections among different EPSs at different temporal locations (e.g., beginning, middle, and end) of the discussion session.

In the assessment, each group of students was evaluated through a discussion on a scenario related to a modern engineering problem with no clear solutions. Using social network analysis techniques, we construct two types of networks to model the dynamics of the communication and connections among EPSs. The data were collected from several engineering colleges in the U.S. Each discussion group has 4 to 6 students. All participants were college engineering major students. The group discussions were audio-recorded and subsequently professionally transcribed. Students' names were anonymized to protect their privacy. Each student was assigned a unique identifier (e.g., A, B, and C) in each group/transcript, which allowed us to conduct discourse and network analyses. We also divide the discussion equally by length into three parts, which enables us to observe the longitudinal trends in terms of the discussion process.

We observed drastic differences in both the communication and the EPSs networks between the high-performing and low-performing groups. For the communication networks, in general, students in the High Groups had more balanced and frequent conversations among themselves, with on average shorter sentences. The Low Groups tended to show less balanced and frequent conversations among the students, though with relatively longer sentences. Also for the Low Groups, the conversations tended to occur among subgroups of students rather than all students during the discussion..

Comparisons of the EPSs networks revealed group differences in the pattern of EPSs integration over the discussion process. In general, students in the High Groups exhibited more strongly integrated EPSs than students in the Low Groups. Students in the High Groups showed more evidence of executing more than one EPSs in single utterances. In contrast, the Low Groups students showed little evidence on presenting more than one skills simultaneously. We also observed interesting temporal pattern, that is, both groups show the least amount of skill integration towards the end of the discussion.

Cassowary Bone Daggers from Papua New Guinea: Similarity networks, ERGM, and spatial modelling, what can they tell us?

James Zimmer-Dauphinee (The Field Museum of Natural History), Mark Golitko (The Field Museum of Natural History), Esther Schechter (The Field Museum of Natural History), Termeh Shafie (University of Konstanz), John Terrell (The Field Museum of Natural History)

In this paper, we explore social and geographical factors that impact the distribution of stylistic and technological characteristics of cassowary bone daggers from across the island of New Guinea dating to the period before 1914 housed in well documented museum collections. Like other similar studies, this project critically explores assumptions commonly made by archaeologists based on the distribution of prehistoric material culture. Some of these studies have attempted to explore these relationships through the qualitative description of networks constructed from similarity measures of material culture. However, this research has generally focused on object classes, to the exclusion of stylistic variation within those classes, and to this point has not attempted to quantitatively examine the local forces which generate the resulting global network structure. The former issue is addressed by this paper's use of stylistic similarity within a single object class, cassowary bone daggers, for the generation of networks. The latter issue is examined through an exploration of the benefits and difficulties in using Exponential Random Graph Models (ERGMs) on anthropological data. Several possible local forces are examined as factors which may affect the global network structure, including spoken language and a spatial cost-distance model indicating how difficult it is to walk from one location to another that serves as an approximation of the perception of distance experienced during typical inter-community movement and interaction. Though producing suggestive results, it is difficult to be confident in the results the ERGMs produced without further research on the effects of sampling bias, which is always highly prevalent in archaeological collections, and more rigorous methodologies of converting similarity measures into meaningful networks.

Networks of Music Groups as Success Predictors

Dmitry Zinoviev (Suffolk University)

More than 4,600 non-academic music groups emerged in the USSR and post-Soviet independent nations in 1960-2015, performing in 275 genres and sub-genres, including rock, pop, disco, jazz, and folk. Some of the groups became legends and survived for decades, while others vanished and are known now only to select music history scholars and fans. The total number of unique performers in all groups exceeds 17,000, and at least 3,600 of them participated in more than one project.

The goal of this study is to investigate if sharing performers with other groups influences the groups' eventual success, and try to predict the success, based on performers sharing. We collected information about 4,560 Russian, Ukrainian, Belorussian, Estonian, Latvian, Lithuanian, and Moldavian non-academic music groups that have one or more Wikipedia pages in any language. We built a network of the groups by representing groups as network nodes and connecting two groups with an arc if they shared at least one performer. The total number of recorded shares is 16,329. For each node in the network, we calculated degree, average neighbor degree, closeness, betweenness, and eigenvalue centrality, and the clustering coefficient. These numbers represent various aspects of performers' sharing, such as openness to sharing (degree), prestige (eigenvalue), and embeddedness (clustering coefficient).

In the absence of sales and chart data caused in the first place by the lack of proper music entertainment industry in the USSR and informal status of most of the groups in the Soviet era, we propose to use secondary but easily collectible descriptors as proxies to the groups' success. These descriptors are the combined group Wikipedia pages visit frequencies (in all languages in the last three years) and maximum Google page rank. We selected approximately 2,000 groups for further analysis.

We discovered that both Google page rank and visit frequency are positively (but insignificantly) correlated with all four centrality measures and the average neighbor degree, and negatively (but insignificantly) correlated with the clustering coefficient. We also discovered that the six network measures together serve as reasonably accurate predictors of the page rank and visit frequency. The accuracy of our random forest-based predictive model is 71% for the visit frequency range (below median vs above median) and 49% for the Google page rank (94% if an error of ± 1 is allowed).

We hypothesize that music groups benefit from the cultural cross-pollination caused by performers moving between different projects. However, these transfers have a limited scope. We calculated the genre-based generalized similarity for every pair of connected groups (sharing at least one musician) and unconnected groups and discovered that the connected groups on average perform in more similar genres than unconnected groups. Likewise, groups performing in similar genres are slightly more likely to share musicians.

We believe that our genre classification mechanism, based on generalized similarity, and the network-based success explanation (and possibly prediction) methods are easily extensible to other areas of arts and humanities that have genre-oriented structure and medium- to long-term team-based collaborations.

Stability of centrality measures in valued networks regarding different actor non-response treatments and macro-network structures

Anja Žnidaršič (University of Maribor, Faculty of Organizational Sciences), Anuška Ferligoj (University of Ljubljana, Faculty of Social Sciences), Patrick Doreian (University of Ljubljana and University of Pittsburgh)

Social network data are prone to errors regardless their source. This paper focuses on missing data due to actor non-response in valued networks. If actors refuse to provide information, all values on outgoing ties are missing. Partially observed incoming ties to non-respondents and all other patterns for ties between members of the network can be used to impute missing ties. Many centralities measures are used to determine the most prominent actors inside the network. Using treatments for actor non-response enables us to estimate better the centrality scores of all actors regarding their popularity or prominence. Simulations using initial known based on three macro network structures: cohesive subgroups, core-periphery models and hierarchical structures were used to evaluate the relative merits of the treatments for non-response. The results indicate that the amount of nonrespondents, the type of underlying macro-structure, and the employed treatment have an impact on centrality scores.

Actor non-response in valued social networks: The impact of different non-response treatments on the stability of blockmodels

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Social network data usually contain different types of errors. One of them is missing data due to actor non-response. This can seriously jeopardize the results of analyses if not appropriately treated. The impact of missing data may be more severe in valued networks where not only the presence of a tie is recorded, but also its magnitude or strength. Blockmodeling is a technique for delineating network structure. We focus on an indirect approach suitable for valued networks. Little is known about the sensitivity of valued networks to different types of measurement errors. As it is reasonable to expect that blockmodeling, with its positional outcomes, could be vulnerable to the presence of non-respondents, such errors require treatment. We examine the impacts of seven actor non-response treatments on the positions obtained when indirect blockmodeling is used. The start point for our simulation are networks whose structure is known. Three structures were considered: cohesive subgroups, core-periphery, and hierarchy. The results show that the number of non-respondents, the type of underlying blockmodel structure, and the employed treatment all have an impact on the determined partitions of actors in complex ways. Recommendations for best practices are provided.

Pizza Talk IV: Fighting back Shitstorms with an Army of Superfans

Thomas Zorbach (vm-people), Juergen Pfeffer (Carnegie Mellon University)

Companies and their brands as well as politicians, governmental institutions, and celebrities increasingly face the impact of negative online WOM and complaint behavior. In reaction to any questionable statement or activity, social media users can create huge waves of outrage within just a few hours. These so-called “shitstorms” pose new challenges for marketing communications in general and specifically for reputation management. The goal of any counter strategy is to individually destabilize as many people as possible in their negative attitude forming. Earlier research have shown that in this process so-called trusted sources come into play. Being a trusted source of information is, by definition, impossible for any company, politician, or other person or institution targeted by an upcoming online firestorm. Instead a target should be able to activate a critical mass of loyal advocates aka “superfans”. Superfans are a relatively new phenomenon in the culture of new media. The term describes loyal people or customers that are far more engaged than average fans. The behavior can be observed in cultural context such as sports or entertainment, but is not limited to these arenas. A network of loyal, well connected believable and therefore influential superfans may have a huge impact on the dynamics and diffusion of a shitstorm. In this talk we present first results of our endeavor to identify superfans in social media and to measure their possible alleviating role on the effects of shitstorms.

Overcoming Decision Biases through Network Structure

Matthias Leiss, Christian Schultz, Eموke Agnes Horvat, Dirk Helbing, and Brian Uzzi

Knowledge about how groups of individuals self-organize to achieve a common goal in complex environments is needed to advance our understanding of collective behavior and network performance. Here, we study how structure and dynamics of the communication network of a large hedge fund influence the fund’s trading activity and market efficiency. Setting up 20,000 natural experiments, we analyze the decision-making of small teams as they execute transactions in US equities with a volume of 335 billion USD. Our findings indicate that a large fraction (33%) of the sequences of buys and sells is statistically indistinguishable from a random walk and non-lucrative. Most interestingly, random trades can be associated with certain characteristics of the communication network inferred from emails and instant messages even when considering the information inflow due to business news and direct email contact with other institutional investors and investment banks. Specifically, a more clustered and balanced internal communication, as well as a more diverse external network of information sources are strongly associated with nonrandom and thus more profitable trading. A model accounting for these effects explains randomness with high out-of-sample prediction accuracy. Our results indicate how individual decision-makers can structure their interactions in complex environments to achieve individual and collective goals.

Who To Ask? Analysis of Information Robustness

Huajie Shao, Tarek Abdelzaher

The paper develops techniques for analyzing information robustness on social networks, as well as for acquiring information that is more robust. Information robustness refers to the likelihood of withstanding errors in information propagation. For example, if all mentions of an information item can be traced back to the same single source, the item is not robust with respect to errors by this source. In general, the tendency of nodes to propagate information on social networks (without independent verification) reduces robustness to upstream errors. This paper deals with the problem of choosing the right sources to solicit data from to minimize the expected error when some sources can influence others and when one's ability to query sources is limited. We first consider the abstract scenario where a group of sources of different reliability are connected by an influence graph such that one can influence output of another. The goal is to reconstruct ground truth from reported observations. We formulate this source selection problem as one of minimization of expected error through zero-one integer non-linear programming (INLP). We then transform the zero-one INLP problem into a zero-one integer linear programming (ILP) problem by introducing equivalent formulations for the objective function. Finally, we evaluate the performance of our new approach based on simulation and real-life data from Twitter. The evaluation results show that our method achieves a lower expected error (i.e., higher robustness) in reconstructing ground truth, compared to selected baselines. The work is motivated by the need to distill reliable information from the proliferation unreliable data reported by unvetted observers on social networks. The results show that careful source selection must take into account not only source reliability but also relations among sources. With appropriate source selection, the probability of collecting accurate information in the presence of noise and distortions is significantly increased.

How teens SpeakOut: Formative research for a social communication intervention on teen contraceptive use

Edith Fox, Whitney Wilson, Christine Dehlendorf

Over a third of sexually active teens at risk for unintended pregnancy use no contraceptive method or a less effective method such as condoms alone or withdrawal. Peers are a valued source of contraceptive information, and innovations to promote social communication about highly effective contraceptive methods may increase uptake of these methods and reduce rates of unintended teen pregnancy. We sought to design an intervention to encourage adolescent users of the intrauterine device (IUD) and the subdermal contraceptive implant to talk about their contraceptive method with peers, informed by teens' experiences with and preferences for social communication related to contraceptive use. We conducted 24 semi-structured interviews and two focus groups (n=11) about social communication about contraception, particularly the implant, with female adolescents age 15 to 19 in Northern California. We performed content analysis and interpreted emerging themes on preferences for social communication. All participants had talked about contraception with a close friend or family member in the past, the majority within the past month. Participants preferred face-to-face conversations or one-on-one texting with peers about contraception over communication on social media, due to desires for private and candid interaction. An approximately equal proportion preferred to access and share contraceptive information in physical pamphlets that they and their friends could "hold onto," as preferred digital information resources. We incorporated our results into the design of SpeakOut, which equips teen users of the IUD and implant to share contraceptive information and experiences with peers using sharable physical pamphlets and digital components.

Teachers' active engagement in social media: A comparison of network interactions across physical and virtual spaces

Zixi Chen, Kaitlin Torphy, Adrienne Hu, and Andy Jurasek

Teachers' interactions and collaborations, to exchange and gain professional knowledge or improve teaching practices (Lave & Wenger, 1991; Frank, Zhao & Borman, 2004; Baker-Doyle & Yoon, 2010; Frank, Zhao, Penuel, Ellefson, & Porter, 2011) may influence their development, social capital, and practice over time (Spillane, Kim, & Frank, 2012). For early career teachers (ECTs) building social networks with other professionals may help navigate teaching demands. Though schools may facilitate social networks formally (Archinstein, 2002; Fullan, 1991), informal network ties may develop (Frank, Zhao, & Borman, 2004) through interactions across virtual and physical spaces (Baker-Doyle & Yoon, 2010). This paper compares the physical and virtual social networks of ECTs including patterns of frequency in their conceptualizations of mathematics and connections.

Education literature has explored the different aspects of teacher community and collaboration in and across schools (Jones, Youngs, & Frank, 2013). Educational reformers have attempted to improve teacher practices, with some

success, through formal communities (Archinstein, 2002; Fullan, 1991) providing teachers an opportunity to make meaning of teaching practices and learn from one another (Lave & Wenger, 1991). Yet increasingly accessible technology has expanded boundaries of teacher collaboration shifting some interactions to virtual spaces enabling ECTs to use both physical and virtual networks when seeking information or reflecting on their profession.

Pinterest, a popular social media site, allows teachers to scrapbook ideas pinning lessons, exemplary teaching, and resources in personalized libraries for later reference. Users may customize their news feed by following those people they are connected with and the pins and boards they post. Similar to the situative perspective, in which teachers' professional community frames their meaning making, ECTs may connect with their colleagues virtually, engaging in both self directed and incidental learning.

To identify networks across physical and virtual platforms, we use a sample of 39 ECTs from several Midwestern states in a NSF funded research studying elementary mathematics instruction. We use surveyed ECTs' social network nominations to identify colleagues' Pinterest accounts. Of 39 ECTs, 35 nominated colleagues with a total of 211 colleague nominations and an average of 6. We identify 19 of 35 ECTs with active Pinterest accounts. For those teachers, we find 64 colleague Pinterest pages and identify network connections with directionality between ECT and colleague, and across colleagues within a school. We generate two sociograms; ECTs physical and virtual social networks. Node size represents the frequency with which teachers conceptualize mathematics, as measured by number of mathematical related pins.

Preliminary results indicate for those ECTs who report social networks within schools, ties did not consistently extend to a Pinterest social network. This differs for ECTs' colleagues, who have more collegial Pinterest ties among themselves. Patterns indicate sampled ECTs within a school are on the periphery of the virtual social network. Furthermore, for network colleagues, social media use for professional purposes is more frequent with more teaching and math pins than their ECT peers. Future work will examine changes in ECTs networks over time across virtual and physical boundaries and the frequency of engagement in professional activities within social media platforms

Can Radio Stations Pick Singles? The Opinion Leadership Hypothesis

Gabriel Rossman

This talk uses data on when radio stations begin playing pop songs to test the opinion leadership hypothesis. This theory assumes that a few highly connected people at the center of a social network are the key to understanding the diffusion of new ideas and practices through a social system. Although social networks among radio stations are characterized by the preferential attachment network structure assumed by the theory, the central nodes are irrelevant to how songs become hits. Rather, radio stations are overwhelmingly oriented towards record labels and the pop charts. As shown in simulation, opinion leadership requires not only the presence of a preferential attachment network structure but also the absence of external influence effects (e.g., payola and other marketing) and non-spatial endogenous diffusion (e.g., pop charts and other bestseller lists). Since such confounding dynamics are frequently present, this suggests that opinion leadership is less important than widely believed and by extension that viral marketing business strategies are unlikely to be successful.

Factors Influencing Parental Decisions: A Social Network Analysis of School Choice in Michigan

Kacy L Martin

The state of Michigan allows parents of students in a given public school to transfer students to a school outside of their assigned district. Particular to Michigan's public schools, the funds for each student follow the child to their chosen school, which has financial implications for all schools involved in this competitive environment.

Because of the wide range of schooling options and variety of parental demographics in Kent County, the selected site for this study, findings from parental choice have the potential to explain similar phenomena in other districts that employ analogous choice policies. Parents whose oldest child is of preschool age will be recruited for the study in order to follow the progression of first-time parents' decision-making and the role that their social interactions play in this process. Their social networks and school choices will be recorded over a period of two years in order to examine the relationship between social exposure and school choice.

Parents appear to choose because of a perceived advantage of a particular educational institution. This study analyzes the decision making process in which parents participate when choosing a school for their children and how parents leverage their social networks to participate in the choice application process.

Examining the demographics of neighborhood schools reveals that poor students of color are more likely to choose their neighborhood school rather than travel to a magnet school, and white students are more likely to attend these specialty schools or leave the public schools all together. Because of the density of public schools options, parents regularly choose schools outside of their immediate vicinity because of a perceived advantage of a particular educational institution.

Survey data from 47 parents of preschool aged children inform this study. Parents responded to questions regarding their assigned neighborhood school, with whom they regularly interact, who they go to for information about schooling, and their reasoning for choosing their current school. The influence model analyzes the correlation between parent social relationships and decisions about school placement. The model will predict the nature of the impact of these relationships, distinguishing between conformity, in which actors change to conform to those around them, information, in which actors change behavior based on new information, or dual processes, in which both conformity and information apply.

Preliminary findings indicate that parents exposed to a social network of others who have chosen to send their students to schools outside of their default neighborhood schools impacts the school choice decision-making process. However, white, high SES parents are most likely to do so.

Social network characteristics and engagement with mental health services among Black-African and African-Caribbean people with psychosis

Amy Degnan, Nick Crossley, Dawn Edge, Katherine Berry, and Kathryn Abel

In the UK, ethnic minorities have the highest rates of psychosis and worst outcomes of mental healthcare when compared to their white counterparts. Over the past few decades, research and policy documents have consistently highlighted that African Caribbean (AC) and Black African (BA) people have inferior access to adequate treatment and the most difficult relationship with services, one that is characterised by fear, mistrust and avoidance. Specifically, reduced help-seeking and non-engagement delays the duration of untreated psychosis such that people of AC and BA backgrounds are more likely to come into contact with services at crisis point via the Criminal Justice System or sectioning under the Mental Health Act (2007). This means that their symptoms are more severe on admission and, as inpatients; they experience more negative and coercive care, higher doses of medication and longer lengths of stay in hospital. Such negative experiences are suggested to reinforce AC and BA people's disengagement and avoidance of services once discharged to the community, leading to an increased risk of relapse and compulsory hospital admission. Further empirical research is needed to understand factors that influence AC and BA people's engagement with mental health services for psychosis, to inform and refine interventions and improve outcomes for these groups. Researchers have conceptualised response to mental illness as a dynamic social process influenced by contacts in the social network who offer advice, information, support, beliefs and expectations. Ethnic variations in help-seeking are hypothesised to be a result of interacting social and cultural factors located within a particular social context or network of social ties, including stigma, explanatory models and perceptions of treatment. Qualitative findings suggest that the existence of a cohesive social network can be a facilitator to seeking professional services through the provision of information and instrumental support, but also a barrier due to perceptions that support is already available in the network or negative views about outside help. We will present the preliminary findings of Clinical Psychology PhD research conducted at The University of Manchester, UK. The main aim of our research is to examine the social network characteristics of AC and BA people with psychosis and test their relationships with engagement with services. Our study analyses the structure (size, density) and quality (composition, frequency and duration of contact, ethnic homophily, strength of tie) of ego-networks in a sample of 50 mental health service users. We also examine whether these relationships are affected by beliefs about mental illness, severity of symptoms, mental health stigma and ethnic/racial discrimination. We are in the process of collecting data from service users and health professionals at two National Health Service (NHS) Trusts in Manchester using the following methods: a) network mapping interviews with name generator questions, name interpreter cards and emotional closeness concentric circles; b) standardised interviews to assess severity of symptoms in psychosis; c) service user and staff self-report questionnaires; and d) semi-structured interviews one month later to provide a qualitative account of these

relationships. To our knowledge, this is the first study to use a network-based approach to examine social networks in this population.

The evolution of social networks in collaborative natural resource governance

Matt Robbins, Mark Lubell

A frontier in our understanding of political networks around natural resource use is how these network change over time. We analyze the evolution of the network of stakeholders in the Caribbean spiny lobster fishery of Honduras over the course of the Spiny Lobster Initiative (SLI). The SLI was a conservation and development program promoting ecologically and socially sustainable fisheries by establishing the foundations of collaborative governance. The inter-organizational network of spiny lobster fishery stakeholder was sampled three times over five years, yielding a unique longitudinal sample with which to analyze network dynamics. Differing theoretical perspectives from the social capital literature yield the competing hypotheses that over time, the network exhibits a) increased overall density, indicating a higher overall level of connectivity between organizations or b) no increase in network density, but instead a re-alignment of ties to create more boundary-spanning relationships among stakeholder organizations. Results of ERG modeling, brokerage analysis and descriptive statistics are consistent with the increased boundary-spanning hypothesis. Our findings have practical and theoretical implications for the institutional design of collaborative development projects.

Poster presentation abstracts

Testing for the Existence of a Representative Interest Actor

Robert Ackland (The Australian National University)

We often hear statements such as “the Government is in bed with Big Business”. What this implies is that the government’s preferences are aligned with, or even indistinguishable from, those of business actors. Such statements are typically made in the context of political rhetoric, and are not subject to (or expected to be subject to) empirical verification.

Policy consultation data have previously been analyzed using network science techniques, for example using bipartite affiliation networks, with interest groups as one actor type, and consultations or topics as another actor type. Such network approaches have been used to assess the dynamics of interest group behavior and issue formation.

This presentation proposes a new method involving the use of the theory of economic revealed preference to empirically test whether different types of interest actors (e.g. government, business, NGOs, trade unions) share common preferences for engaging with (or “consuming”) different types of issues (e.g relating to health, education, the environment). The approach is demonstrated using a dataset compiled from records of policy consultations launched by the Scottish Office (1982-1999) and Scottish Government (1999-2007). The dataset includes 1,657 consultations, which received over 80,000 responses from more than 18,000 discrete policy actors (institutions, interest groups, government departments/agencies, and politicians).

The Role of Social Network Setting in Success and Embeddedness at School

Shani Almog (Department of Psychology, Bar-Ilan University, Israel), Ofrit Lesser (Department of Information Systems Engineering, Ben Gurion University of the Negev. Telekom Innovation Laboratories at Ben-Gurion University of the Negev, Israel), Meni Koslowsky (Department of Psychology, Bar-Ilan University, Israel)

The task performance and job embeddedness concepts are both driven from the organizational psychology. Task performance refers to the employee’s contribution to organizational performance. High performing employees often get promoted, as well as honored and awarded by the organization. Therefore, it is considered to be a rational factor in the individual’s behavior. Job embeddedness, on another note, relates to the social web an employee becomes involved with during the employment period. Job embeddedness is measured by the extent to which employees are linked with other employees and the difficulty in breaking the emotional links an employee has with his job and its

organization. It has been identified as a good predictor for voluntary turnover and is considered to be an emotional factor is the individual's behavior. Relatively few studies have examined these concepts in a multiplex social network setting where individuals simultaneously interact in multiple social contexts by maintaining several types of social ties. In this study we suggest that task performance and job embeddedness are reflected by an individual's social network. We examine a network with two types of ties: professional and personal, and suggest that (1) the rational aspect of the individual (task performance) is associated with the effective size of the ego's network, and reflected in the professional network more than in the personal network; (2) The emotional aspect of the individual is associated with in-degree, and reflected in the personal network more than in the professional network. We examine several social networks - containing professional and personal ties - which were collected from various organizations via questionnaires. Our preliminary findings focused on social networks of undergraduate students. Generally a university has two major goals regarding undergraduate students: encourage high academic achievements and nurture their appreciation towards the institution to allow retaining top students as graduate students. Therefore, the students' task performance may be reflected by the grade and the job embeddedness by their commitment and appreciation to the institution. Our study examined a course in the psychology department of a university ($n=88$). It aspired to connect different aspects of the network to different aspects of the students' behavior, in two separate social networks: a social network of professional ties and a social network of personal ties. Our findings indicate that task performance - final grades - are associated with out-degree, both in the personal network ($F=7.9$, $p=0.006$) and the professional network ($F=8.17$, $p=0.005$). Embeddedness was found to be associated with in-degree in the professional network ($F=4.35$, $p=0.041$) and not in the personal network. In addition, embeddedness was associated with effective network size in both networks (personal network: $F=12.68$, $p=0.001$; professional network: $F=6.43$, $p=0.013$). These preliminary findings suggest that task performance may be most associated with the connections individuals establish with others. In contrast, embeddedness is connected to in-coming connections of the individual as well as the effective network size. It appears that social network type (personal versus professional) has a similar impact on the individual in most cases.

Sexual Network Formation Among Undergraduate Students at the University of Cambridge

Mary-Catherine Anderson (Stanford University), Mary-Catherine Anderson (Stanford University)

The University of Cambridge is a collegiate university where every student belongs to one of its thirty-one, autonomous constituent colleges. While studying at Cambridge, a student's college serves as his/her "home base" and is where a student lives, eats, socializes, and receives academic and pastoral support. There is substantial heterogeneity among the colleges with respect to size (enrollment), physical location, acceptance rate, percentage of students from privileged secondary schools, academic performance, and financial assets. Colleges with the most financial assets typically have higher percentages of students from privileged secondary schools. Relative to the "new" colleges (established 1800 - 1977), the "old" colleges (established 1209 - 1596) are thought to possess storied histories and high prestige. Due to their earlier establishment, the old colleges also tend to be geographically proximate to one another clustered in the university center. Herein, I explored whether the apparent dichotomy in geography and the notion of status in the Cambridge collegiate system shaped social relationships, particularly sexual contacts, among undergraduate students. Sexual relationships not only play an important role in shaping long-term social ties; they also represent a clearly definable and, thus, easy to measure relationship. Specifically, I examined whether choice processes that were social (e.g. homophilous or heterophilous with respect to college attributes) or non-social (e.g. systematic constraints, such as geography and availability of sexual partners) gave rise to observable trends in sexual partner selection. Using a principle component analysis, college attributes were grouped into two major categories: status categories (financial assets, percentage of maintained students) and selectivity categories (acceptance rate, college age), with academic performance equally weighted in both components. Sexual partner data were collected via an online survey platform from 1,152 students. I found that, among respondents that reported a sexual partner from an outside college, non-social constraints better explained the observable trends than social processes of partner selection. These effects had differential impacts on sexual partner selection between individuals of high- and low-status colleges. Finally, I found that network structural properties, such as weighted-in degree, had positive correlations with college characteristics such as college status and college size, and displayed clear geographic trends. These findings suggest that the social and systematic properties of the collegiate system of University of Cambridge influence the ways in which students interact sexually, and therefore socially.

Comparing Multilevel Social Capital Measures on Individual Effectiveness in Massively Multiplayer Online Game Teams

Grace Benefield (University of California Davis), Cuihua Shen (University of California Davis)

Within social networks, people often interact and organize with both individuals and within interdependent groups. In online communities, people cluster together in virtual teams (VTs) to collaborate, but they also connect dyadically with other individuals within or between VTs, in a boundary-spanning dynamic. This creates a complex, multilevel network structure, where individuals connect to other individuals, individuals connect to their groups, and groups connect to other groups. Within these VTs, individuals are motivated to progress in a way that personally benefits them, but organizations often want VTs to coordinate in a way to maximize the group's output. For the purpose of motivating individuals to collaborate within VTs, it is critical to understand how individual performance (in addition to group performance) can be improved by contributing at different network levels. This study tests the effects of two different social capital measures, closure and brokerage, on individual effectiveness for individual and group networks. Social capital is the total value of the resources in actors networks based on their structural position. Closure describes the level of an actor's embeddedness in a network, with networks with high closure having many redundant ties. Brokerage, the second type of social capital, describes an actor's ability to fill structural holes in a network by connecting otherwise unconnected groups. Because some closure is associated with greater group performance to a certain point, it was predicted that a moderate amount of closure was associated with maximal individual effectiveness. This is because networks with high closure tend to have greater trust, but lack a diversity of resources. Because a network with high brokerage tends to have a greater diversity of access to resources, it was predicted that greater brokerage leads to greater effectiveness. In this study, data from the server logs of a Massively Multiplayer Online Game (MMOG) were used. The analysis used a sample of guild members from one of the 804 guilds that were founded during the three-month collection period, resulting in a total of 11,549 characters from the Chinese MMOG Dragon Nest. A guild tends to be a somewhat longer-term VT that players join as a way to gain access to resources, and facilitate social or teaming interactions. A short-term type of group network was used to measure the structure of interactions between both the character-character and guild-guild networks. Controlling for individual experience, group experience, group age, and group performance, individual networks better predicted effectiveness compared to group networks. Individual effectiveness was defined as a rate of change, with greater effectiveness associated with those who advanced quicker than the average. When testing for social capital, the level of both individual and group closure did not significantly predict effectiveness. In addition, because it takes time for individuals to construct a diverse network, greater individual brokerage was associated with a lower level of effectiveness. Within groups, however, greater brokerage to other groups predicted greater effectiveness, likely due to group-level effects that trickle down to group members.

Drug Supply Networks: A Systematic Review of the Organizational Structure of Illicit Drug Trade

Gisela Bichler (California State University, San Bernardino), Aili Malm (California State University, Long Beach), Tristen Cooper (Center for Criminal Justice Research)

Comparing different metrics, data sources, and network boundaries, this poster presents a systematic review of research that uses social network analysis to study the structure of organizational crime groups involved in drug trafficking. Our objective is to put to rest the longstanding debate in the criminological discourse and determine whether the balance of evidence supports the argument that organized crime groups are loosely structured, or if instead, hierarchical structures dominate. Coding for a variety of network size and structure variables, we compare more than 15 illicit drug supply networks using descriptive and p^* models, where possible. We conclude with implications for anti-drug policy.

Trans-/Internationalization of Climate Change Discourse on Twitter

Cornelia Brantner (Dresden University of Technology), Juergen Pfeffer (Carnegie Mellon University)

The scientific and journalistic consensus about its existence notwithstanding, anthropogenic climate change and global warming remain politically and socially polarizing topics, particularly in online environments. Moreover, researchers blame the lack of comprehensive climate legislation and mitigation policies on the fact that advocates have failed to engage the public. Furthermore, as climate change is a global issue, mitigation measures are negotiated and set on the international level (esp. at the 2015 United Nations Framework Convention on Climate Change (COP 21) in Paris), and, thus, efficient climate policy is dependent on the legitimization and implementation in as many countries

as possible. Although research on climate change communication has grown significantly in recent years, there are still research gaps regarding online discussions, the contribution of different actor groups (e.g., political, scientific, industry, media, NGO, grassroots actors), and, particularly, the transnationalization of online debates and networks. Our project addresses some of these voids by providing an analysis of climate change discussions from the Twitter microblogging platform.

From the Twitter Decahose (a 10% sample of all tweets) we extracted about 1 Million tweets over the course of three years related to climate change in multiple languages. We created user networks based on mentions and re-tweets for 20 countries/regions of interest. We analyzed each of these networks in terms of reciprocity, fragmentation, and language diversity as well as the interconnectivity of the regional networks. We also localized regional networks in the global Twitter discourse network. Additionally, we analyze the polarization of selected language networks and investigate if people with similar views primarily communicate with one another (homophily).

We reveal different structural properties for different countries/regions. In general, we show evidence that these discourses form sparse networks in which news media and governmental institutions (e.g. NASA) play a crucial role. Although, the majority of diadic interactions stays within national borders, we can also observe a tendency of trans-/internationalization in the climate discourse networks on Twitter, often triggered by media, but also around international events (e.g. people's climate march).

We not only analyze which actors from different societal levels (political, scientific, industry, media, NGO, grassroots actors) contribute to Twitter communication on climate change in different regions and countries, examine the conversational connections, and identify the most authoritative actors in the different networks, we also study network level characteristics. Moreover, we are especially interested in determining the geography of communication on climate change in order to answer the questions of how transnational and international the different networks are and across which regions and countries the Twitter debate shows transnationalized patterns of communication.

Network characteristics of microfinance borrowing groups

Jessica Burke (University of Pittsburgh), Teagen O'Malley (University of Pittsburgh), Jana Smith (Pro Mujer), Thomas Valente (University of Southern California)

Microfinance programs provide small loans to low-income borrowers who would otherwise not have access to such capital. These microcredit loans are often based on a group banking methodology where women interested in taking out a loan join or form a group with women who are also interested in having a business loan. This borrowing group, comprising 8 to 15 women, guarantees each other's loans. To date no research has characterized the social network ties of microfinance participants. This study shares results of a pilot project between academic public health researchers and an international women's development organization providing microfinance. We characterized the borrowing group networks, explored factors associated with network characteristics, and examined the concordance between informal and formal leadership (e.g. president of the borrowing group). We collected data from 240 microfinance clients from a randomly selected sample of 36 microfinance borrowing groups located at two loan centers in southern Peru. Using interviewer-administered surveys borrower group network characteristics were measured by asking borrowers to list up to seven people from their borrowing group "with whom you talk to most often". For each nominated person, participants were asked a series of questions about their relationship with the individual. Borrowing group size ranged from 3 to 12 and the average number of other borrowers nominated by participants (out-degree score) ranged from 0.50 to 5.38. Network density ranged from 0.167 to 1.0. We also regressed the frequency each person was named as a discussion partner on a series of socio-demographic characteristics and found that some of the predictors of being an informal leader vary by loan center. Borrowers with a longer borrowing history were more likely to receive informal leader nominations. In center 1, the women who had participated in more loan cycles were more likely to be nominated as discussion partners. In center 2, in addition to participation in more loan cycles, group presidents and those in other formal roles were more likely to receive the highest number of nominations and older women were more likely to be leaders. These pilot project results are the first to use a social network approach to characterize and understand the networks of microfinance borrowers. Results support the feasibility of using a social network approach and provide interesting insight into the borrower group dynamics of microfinance participants in Peru.

Developing MCMC sampling methods for estimating exponential random graph models

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As information and communication technologies continue to expand the definition of - and the boundaries around "social groups," the need arises to develop analytical strategies capable of accommodating new and larger sets of social network data that new definitions entail. Stimulated, in part, by the recognition of this need, considerable attention has been dedicated recently to the possibility of scaling Exponential random graph models (ERGMs) - a well-established family of statistical models for analyzing large social network data. Reliable estimates of ERGM parameters may be obtained by means of Markov chain Monte Carlo (MCMC) maximum likelihood estimation. These methods are generally based on MCMC simulation of a distribution of graphs from a starting set of parameter values and subsequent refinement of the estimates. MCMC simulation is computationally expensive and constrains the size of networks that may be analyzed. Efficient computational methods would be therefore highly desirable in order to extend the empirical scope of ERGM for the analysis of large social networks. With this goal in mind, in this work we report preliminary results of a research project on the development of new MCMC sampling methods for ERGMs. We show that, using this method, the CPU time for parameter estimation may be considerably reduced. Simulation and estimation procedures were performed on Cray XC30 "Piz Daint" at Swiss National Supercomputing Centre. The performance of the computational approach we propose is illustrated on both simulated and empirical network data. We show that when the approach we propose is used in combination with recently developed conditional estimation from snowball sampling, larger samples may be studied, and estimates of Exponential Random Graph Models may be obtained faster and more reliably.

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Emergence of core discussion networks over time in online public forums

Sujin Choi (Kookmin University)

Online public forums have been settled as familiar loci for those who enjoy political discussions. Many studies of online public forums have found the presence of a certain group of influential participants labeled influencers, discussion catalysts, mavens, or traditionally opinion leaders. However, few have demonstrated whether and how the aforementioned influential groups change over time: Do the same people remain influential as time goes by? Or, do they just come and go, become influential for a certain moment, and fail to maintain stable positions in the network? Furthermore, we also question whether the online public forum evolves into a core discussion network for political discussions in the long term. Core discussion network is defined as a group of people whom one discusses important matters. Despite the ambiguity of what important matters are, we assume political matters as critical and sensitive stuff that one cannot comfortably discuss with even family members or relatives without any hesitation. The core discussion network tends to be composed of strong and stable ties that do not easily dissolve over time. The emergence of this network can be a positive indication that implies the stability of online public forums. To address the questions above, we gathered data from an online public forum for a full year between July 2014 and June 2015 in South Korea. The number of posts collected was 15,452 in total. We constructed discussion networks by month, which generated 12 networks with nodes of forum participants and ties of who-to-whom replies. If A replies to B's post, the network is formed as follows: A(replier) $\rightarrow$ B(poster). It is directed and valued. The descriptive analysis indicates that the number of posts, replies, and nodes has altogether declined for the one-year period. The percentage of posts that had no reply was 52.5% in average. The preliminary analysis indicates that discussion networks were not densely connected(density: 0.03~0.08) and reciprocated(reciprocity: 0.09~0.15) but centralized(Gini coefficient: 0.77~0.84), being influenced by a few number of people. The consistent tendency of change in these indices over time was not detected. In addition, we conducted Kendall's tau correlation analysis of the in-degree centrality of each node by month and found that participants who received more(or fewer) replies than others tend to obtain more(or fewer) replies in different time windows as well-the correlation coefficients ranged from .50($p < .01$) to .79($p < .01$). The

emergence of core discussion networks was examined by calculating the modularity scores of 12 discussion networks. Unlike many other methods to identify sub-groups, modularity method does not require predetermining the number or size of groups and does consider tie strength to detect sub-groups. We found the increase in modularity score from 0.182 in July 2014 to 0.279 in June 2015. This result implies the growing tendency to have intimate discussion partners, as the online public forum matures over time. For a closer examination on the emergence of core discussion networks, this research will investigate the underlying dynamics of creating, maintaining, dissolving, and reconstituting ties within a year span by conducting longitudinal ERGM.

Networking for Good: Nascent Social Entrepreneurs and Their Personal Networks

Jordi Comas (bucknell)

While there is burgeoning research on social entrepreneurs and innovators, little has been done to systematically examine what factors matter in the early days or nascent period of individuals adopting the mantle of “doing good.” Research into entrepreneurs and social networks suggests that network position, network demographics (such as size, heterogeneity), and network action such as forming ties will matter as much or more for nascent social entrepreneurs. I propose one way to examine nascent social entrepreneurs is to start collecting longitudinal data on those intending or launching new projects. This poster will present initial results from a cohort of 8 students awarded summer grants to start social entrepreneurship projects. Using qualitative analysis of their proposals and reports along with egocentric network data, the poster will explore two topics.

Firstly, what are reasonable outcomes for nascent social entrepreneurs? Impact or success may be premature for these kinds of projects. Organizational foundings, alliances with existing organizations, and intention to continue may be more relevant. Secondly, how do the patterns of outcomes correlate to network structure and demographics? While research suggests that larger, more diverse networks will be more valuable, there may be limits to this as larger, more diverse networks also require more time and attention to manage. In addition, the advantages of brokering over structural holes may not be as effective for these individuals when those structural holes bridge “broad” social chasms such as nationhood, class, ethnicity, or other ascribed statuses. Finally, one surprising result is that particular dyads seem crucial to outcomes. These nascent social entrepreneurs are sometimes foreigners to the target population and other times they are from the target society, but are from social positions of higher status or greater wealth. A role I call “confederate.” Hence, the egonets of each project have particular dyads of foreigner-ally (a person within the target population) or confederate-ally. The poster will describe how the presence and network position of these dyads affect meaningful outcomes.

The “Hub Effect”: Airline Hubs as Facilitators of Theft from Passengers’ Luggage

Tristen Cooper (California State University San Bernardino), Nerea Marteache (California State University San Bernardino)

Pilferage from air passengers’ luggage by airport employees is often reported in the news and causes concern among travelers. It is an indicator of vulnerability in the aviation network: If offenders have access to passengers’ luggage to steal items from them, that access can also be used to transport drugs, stolen goods, explosives, etc. Therefore it is very important to know where those thefts happen, and why they happen most at certain airports. Previous research findings show that smaller airports seem to be riskier. However, these results only take into account the origin and final destination airports of each trip, disregarding the layovers in-between connecting flights, or how airports are connected to one another. That is, when a passenger reports that something has been stolen from his bag, the TSA records it as having occurred at the airport of origin. However, in trips that involve layovers, the luggage is unloaded, transported, stored, and loaded into the next plane as many times as connecting flights the trip has, increasing the opportunities for theft. Attributing all thefts to the airport of origin without taking into account the role of the “hubs” (transfer points used by the airlines to facilitate transport to/from various smaller destinations) may be artificially inflating their rates, thereby misdirecting crime prevention efforts. This type of limitation is common in transportation crime research, where we know that a crime happened between two points, but cannot specifically determine where. This study will focus on the role of hubs and airport interconnectivity as facilitators of crime. Social Network Analysis will be used to modulate theft rates depending on the relative importance of each airport in the commercial aviation network of the U.S. Analyzing airport theft rates according to the airports’ relative weight in the

general air transportation network will help identify which ones constitute likely entry points of criminal activity into the system.

Workplace democracy and political participation: A social network study of the link between workplace experience and political behaviour

James Coutinho (University of Manchester)

In a workers co-operative employees are joint-owners of the firm and participate democratically in workplace decision-making. Much has been written about the beneficial link between workers co-operatives and political behaviour. Pateman argued that by participating democratically in workplace decisions individuals learn the psychological dispositions needed to participate in political democracy (Pateman 1970). Empirical tests of this argument have produced mixed evidence (Greenberg 1981; Maxwell-Elden 1981; Greenberg et al. 1996; Karasek 2004; Guowei & Jeffres 2008; Adman 2008). These studies pay insufficient attention to the internal dynamics of workplace democracy, and how different workers have differential access to participation opportunities and experience different outcomes as a result.

Outcomes for organization members are contingent on location within organizational social networks (Brass 1981; Burt 2010). A case study was conducted in the UK of a workers co-operative with 200 employees. Network data was collected on who workers go to for help when they want to change or improve something about the running of their workplace. Ego network measures and node-level multiple linear regression in UCINET was used alongside in-depth interview data to examine the relationship between workplace influence and political behaviour and attitudes. Workplace influence is operationalized as indegree centrality. Workplace social resources are operationalized as the maximum indegree of ego's alters.

Results indicate that political participation is negatively related to satisfaction with influence over workplace decision-making. The relationship is mediated by indegree. Highly politicized individuals are likely to have lower indegree and be more dissatisfied with their level of influence as a result. Indegree centrality is positively related to external political efficacy. Interview data suggests that central individuals are more business-minded, and have pragmatic attitudes towards both workplace democracy and political democracy. They see democracy as a complex process that involves balancing competing interests and taking difficult, sometimes unpopular decisions in the common interest. Political participation is positively related to feelings of alienation from the political system and to workplace social resources. Interview data reveals politicized individuals tend to feel alienated from traditional politics, and see their exclusion from workplace decision-making as resulting from the same inequities that underlie wider political exclusion. However, they are more likely than less politicized individuals to use networking behaviour to agitate for change at work. Interview data is used to argue that a process of democratic degeneration has taken place in the co-op, whereby more business-minded individuals who are less concerned with the equalization of workplace power have obtained influence and decreased democracy in response to economic pressures on the firm. More politicized individuals are dissatisfied with this situation because they view their work as part of their political identity and are ideologically committed to the equal distribution of workplace power. Consequently they are more likely to agitate for change, and are seen as a nuisance by central individuals. It is argued that competitive market pressures make it hard for co-operatives to equalize power, and that inequities in power at work come to mirror wider societal inequalities. Therefore positive effects on workers' political behaviour are overestimated.

Perceived Stress and Social Networks among Young Adults: A Longitudinal Study Measuring Social Interactions with Mobile data and Self-reports

Agnete S. Dissing (Copenhagen University), Naja H. Rod (Copenhagen University), Thomas A. Gerds (Copenhagen University), Rikke Lund (Copenhagen University)

Much research has found that social relations are protective against stress and promotes well-being. Less research has focused on whether perceived stress limit the ability to engage in social interactions. In addition, the predominant research in this area merely relies on survey self-reports to measure social interactions, although the inaccuracy of this measurement method recently has been emphasized. In a group of young adults, we aimed at investigating whether perceived stress influences the development of the social interaction behavior over the course of 10 months. We extend the existing literature by employing mobile phones to obtain information on social interaction behavior on a daily basis in addition to self-reporting of social interactions. We use data from the Copenhagen Network Study; a study following college students (N=700) with personalized mobile phones and repeated surveys. At baseline, the students

responded to questions regarding perceived stress and social interactions. Further, the frequency, the diversity and the duration of social interactions on a monthly basis at the ego-level are derived from smartphone information capturing different aspects of social interactions: face-to-face interactions are measured using Bluetooth scans, and interactions beyond face-to-face is measured with call and text message logs. Preliminary results shows that young adults with high stress on average have more and longer interactions registered with call and text messages than non-stressed individuals. This pattern also appears to be reflected in the self-reported social interactions. However, when it comes to physical meetings registered with Bluetooth, this pattern is not present as there is a tendency for stressed individuals to have shorter physical meetings

Exploring Information-Optimal Network Discretization for Dynamic Network Analysis

Derek Doran (Wright State University), Matt Piekenbrock (Wright State University)

There is wide recognition that a dynamic network $G = \{G_1, G_2, \dots, G_n\}$, where each G_i represents the nodes and relations present during the i th time interval of a dataset, is a higher fidelity representation of a system compared to a single static network. This is because the evolution of the structure and attributes of a system can be quantified by the differences between the structure of consecutive G_i 's. However, a time-ordered data set must be manually "binned" into a set of n time intervals, such that each G_i represents the relationships and activities during the i th interval of the data, to build G . The choice of bin size and degree to which they overlap is presently performed manually by an analyst, with no guidance except for her intuition about the size and overlap that "makes sense" considering the system under study. Yet this decision fundamentally affects the structure of each G_i and the size of G , causing most dynamic network algorithms to draw separate conclusions over different discretizations of the same dataset. It would thus be ideal to have an automatic discretization method that leads to a dynamic network representation that maximizes some set of criteria. In this work, we carry out a systematic study about how Shannon's definition of entropy may be used to automatically discretize a dataset toward building an information-optimal dynamic network. The use of entropy is motivated by the fact that, in many applications, a dynamic network representation should convey as much "information" as possible about the evolution of a system over time. We consider an entropy-based measure of the information content of a dynamic network that involves inducing a probability measure over its nodal and relational statistics. Our experiments systemically explore how varying bin sizes and overlapping time intervals affect the measured information content. We also explore how the measure may be used to automatically build near "information-optimal" dynamic networks from a dataset, and its utility in extracting anomalous or surprising events within it.

The Niakhar Social Networks and Health Project: An Introduction

Laetitia Douillot (The George Washington University), John Sandberg (The George Washington University), Valerie Delaunay (IRD/LPED), Yacine Boujija (The George Washington University), Insa Diouf (IRD)

This poster presents an introduction to a new, extensive source of social network data collected in rural Senegal, funded by the National Institutes of Health, the Niakhar Social Networks and Health Project (NSNHP). The NSNHP was created to overcome a number of critical design problems in conventional social network surveys, including respondent-reporting of network members' (alters) characteristics, the structural censoring of both types of interaction investigated and the number of alters elicited from respondents

The key innovation of the NSNHP is in linking an expanded social network panel survey to the ongoing Niakhar Health and Demographic Surveillance System (NHDSS) to produce perhaps the largest, highest-quality demographic and health social network data ever collected. Interviews were completed with 902 randomly selected residents of NHDSS study area (allowing for egocentric, population representative analyses), and with 1302 residents (the entire population) of one select and bounded village within the zone (allowing for sociocentric analyses).

Unlimited numbers of alters were elicited in the network instrument for each of 16 name generators, identified through qualitative research and representing four theoretically key domains of interaction. Responds cited on average, 27 unique alters. Extensive information concerning alters was also collected, including relationship type, two measures of subjective affective ties, duration of relationship and measures of time spent together.

In addition to the network instrument, the survey included a large substantive section with multiple measures related to health ideation and experiences, fertility, family planning, women's status and intimate partner violence. Data from

this section, in addition to the wide range of information collected by the surveillance system concerning health and demographic behaviors, household composition and economic status for all members of the study population provide a wide base for the analysis of the association between (and potentially diffusion of) individual and characteristics and network processes.

The NSNHP also contains data from two special instruments, fielded between survey panels, designed to address methodological questions of relevance to social network surveys more generally. The first used a roster-based methodology to develop secondary/alternative measures of network reciprocity and density, for which 500 alters cited in the first panel survey were selected as respondents. Respondents were presented with a list of names, generated as a proximity-stratified random sample of members of the surveillance system, in which the names of individuals who had cited them in the prior panel were inserted. The second instrument was a simple re-interview of 300 respondents to the first panel of the main survey to assess stability and change in networks between waves.

Both methodological instruments asked a supplementary series of questions concerning health ideation of both identified alters and respondents. The re-interview instrument also contains questions concerning demographic and physical characteristics of alters' households that correspond to information in the surveillance system. These data can be used to assess the degree to which alters know these characteristics of egos in the first panel, and how closely they correspond. The roster instrument additionally employs a random question order design to facilitate analyses of consensus and conformity effects.

A dark ecology of law-breakers

Christofer Edling (Lund university), Amir Rostami (Stockholm university)

Using Swedish data, we describe a "dark organizational ecology", where various criminal groups interact with each other through joint participation in crime. The study presents an analysis of nine different well-identified criminal groups across roughly 150 units, focusing on members criminal careers (co-offending) over a 15-year period. Relations between groups occur as a result of individual criminal careers, leading to pronounced connections between different criminal groups including some unexpected cross-affiliations.

Emergency Management Organizations' Twitter Follower Growths During and After Disasters

Brian Espinoza (University of California, Irvine), Nolan Phillips (University of California, Irvine), Ben Gibson (University of California, Irvine), Cedar League (University of Colorado, Colorado Springs), Britta Johnson (University of Colorado, Colorado Springs), Emma Spiro (University of Washington), Sean Fitzhugh (Army Research Office), Jeannette Sutton (University of Kentucky), Carter Butts (University of California, Irvine)

Many emergency management organizations (EMOs) rely on social media as a platform to disperse time-sensitive information during emergencies. Research into terse messaging in an online context shows that messages are more often retransmitted when posted by organizations with a greater number of followers, making it possible for the message to reach a larger portion of the population. However, little is known about what factors predict follower counts, the properties of follower growth over the course of an event, and whether followers continue following post-event. Using a large dataset from the popular micro-blogging website Twitter, we tracked several organizations' accounts over the course of five hazard events and examined their follower count as it progressed over time. In addition to mapping follower counts as a time series over event intervals, we aim to predict follower counts as a function of both time and actor-level attributes. We find that many organizations converge upon a maximum follower count early in the event sequence, suggesting a rapid convergence of attention to organizations responding to an emergency event. As a percent change in follower count, many local organizations increase their counts by several factors, while larger, federal organizations have minimal increase. Implications for EMOs are discussed. We are ultimately able to gain insight on the salience of follower counts as it pertains to change over time, where the rapid diffusion of time-sensitive information is capable of ensuring public safety.

Drug or alcohol use self-help group attendance and social network composition among drug users

Oluwaseun Falade-Nwulia (Johns Hopkins University), Tobin Karin (Johns Hopkins University), Carl Latkin (Johns Hopkins University)

The current study examined personal network factors associated with attendance at 12 step or self-help groups for drug or alcohol use (including Narcotics Anonymous (NA) and Alcoholics Anonymous (AA)) among drug users in Baltimore, Maryland. These data were collected as part of a baseline assessment for a behavioral intervention to address depressive symptoms and HIV risk behaviors among drug users. There were 801 substance users (heroin, cocaine, and/ crack) who were administered the baseline survey between July 2009 and January 2012. The mean age of study participants was 43 years (age range 19-55 years). Almost all (96%) were unemployed in the prior six months and 43% were female. In a multiple logistic model, which controlled for age, gender, and education, participants who reported attendance in self-help groups other than NA and AA had statistically significant less dense and larger networks. They also had more network members in drug treatment, fewer sex partners, more kin, and more network members with whom they could talk to when they felt down or stressed. Participants who reported that they went to NA or AA meetings once a month or more were also significantly more likely to have more network members who were in drug treatment, more network members with whom they could talk to when they felt down or stressed, and fewer current drug users in their networks. The results of this study suggest that drug users who attend self-help groups tend to have network members who are in drug treatment as well as network members who provide support during stressful periods. We do not know if self-help group attendance tends to influence network composition, network composition influence self-help group attendance, or whether these factors are mutually influential.

Collective Problem-Solving in Networked Environments

Michael Foley (Northeastern University), Christoph Riedl (Northeastern University)

The ability of humans to solve problems has long been explored by psychologists, anthropologists, sociologists, linguists, computer scientists, and others. In particular, the ability of teams or groups to solve problems has been shown to vastly outperform individuals for some tasks. A key factor affecting performance in collective problem solving is the tradeoff between exploitation of known solutions and exploration for novel solutions. Prior work showed that efficient information sharing can limit the scope of exploration that takes place, leading the group to converge on suboptimal solutions. On the other hand, less efficient networks promote increases in information diversity and lead to better solutions. In this paper, we have two goals. The first is to further understand the effect of the network on exploration and exploitation. Second, we are interested in how changing individual behavior affects exploration and exploitation within a given network structure.

While agent based models have focused on the limits of efficient information sharing, real world studies have shown that humans perform better on collective problem solving in more efficient networks. We posit that this is partially due to the assumption of hill climbing agents. Since hill climbers always get stuck in local optima, we introduce "risk-taking" agents, who are able to take larger steps than hill climbers in the fitness landscape. These agents have a larger search radius, which increases the variance of the solutions they might explore.

We use agent based modeling to study collective problem-solving across a variety of networks. We find that more overall exploitation takes place in less efficient networks, and thus exploration occurs less often in these networks. However, the exploration that does occur is more likely to be successful because of the diversity of information that low efficiency networks are able to maintain. We also find that risk takers increase overall group performance in all network environments, and that heterogeneity of agent behavior (i.e. mixing risk takers with hill climbers) further increases group performance. This is because risk takers are able to explore their way out of local optima in a way that hill climbers cannot, while hill climbers, as their name would suggest, can reach local optima more easily than risk takers. Last, we show that the presence of risk takers can help overcome the negative effect of converging too quickly in fully connected networks if additional constraints are introduced regarding which solutions can be adopted.

Mapping Food Networks and Habits among SNAP Recipients

Darcy Freedman (Case Western Reserve University, Prevention Research Center), Madalena Monteban (Case Western Reserve University, Prevention Research Center), Kristen Matlack (Case Western Reserve University, Prevention Research Center), Emily Jennings (Case Western Reserve University), Coleen Walsh (Case Western Reserve University), Kimberly Bess (Vanderbilt University)

Informal networks are some of the most persuasive strategies for disseminating information about nutritious food access interventions such as farmers' markets and healthy food incentive programs. These types of interventions are particularly important for populations experiencing food insecurity and/or diet-related health conditions such as people receiving Supplemental Nutrition Assistance Program (SNAP) benefits. However, current utilization of nutritious food access interventions remains low among SNAP populations. This research examines factors influencing dissemination and adoption of nutritious food access interventions among SNAP recipients by exploring how these interventions fit within the broader socio-cultural context, including social networks, within which food procurement, preparation, and consumption occurs. A mixed methods approach was employed including semi-structured interviews and participatory social network mapping with 30 individuals receiving SNAP benefits who were recruited based on prior participation in survey research related to factors influencing nutritious food access. The study occurred in Cleveland, Ohio, USA. A purposive sampling strategy was employed prioritizing six indicators to guide recruitment of the 30 individuals including: social network size, farmers market shopping behaviors, geography, working or student status, education level, and race/ethnicity. The interviews were structured to identify social network processes and pathways for communication and information sharing related to nutritious food access interventions as well as the places relevant to food habits. The research draws from Lin's theory of social capital suggesting embedded resources in social networks enhance the outcomes of actions. Specifically, the theory posits four elements including information, influence, social credentials, and reinforcements deemed critical to social capital. Correspondingly, during the interview we guided the participant to draw a map of the people and places involved in the ego's procurement, preparation, and consumption of food. In addition, the interview questions identify information sharing and influence related to the same three areas of food habits. At the end of the interview we have gathered a physical social network map and a record of attributes including relationships related to information sharing and influence. Results reveal variability in network structure related to food habits influenced, in part, by access to transportation. Many networks are family-based limiting opportunities for transmission of information about nutritious food access interventions using peer-based networks. The research informs methods for utilizing informal social networks to increase the reach of nutritious food access interventions, and highlights some of the challenges to this dissemination approach given network structure among the targeted sample.

Modeling misclassifications in multilayer networks

Devin Gaffney (Northeastern)

In an emergency situation, the diffusion of the notification for the emergency often occurs through multilayer networks. Similarly, breaking news, gossip and even routine interpersonal communication occurs across and within many communication channels, often simultaneously. Networked communication has long been held to be fundamentally multilevel, where actors may continue conversations across various media. For the researcher, accurately modeling these multilayer networks bring along Type I errors (misclassifying a tie) and Type II errors (failing to resolve cross network ties) that may hinder the accurate modeling of multilevel interactions. In other terms, given two networks and some ties between those two networks, how many of those ties must be correctly assigned in order to ensure an accurate representation of the dynamics of information diffusion across the networks? This paper aims to explore an empirically problematic situation. When joining two networks, resolving which node in the first network corresponds to which node in the second network can result several different situations: resolutions that are correct, resolutions that are incorrect, and resolutions that fail to be resolved. This paper presents a model in which different error rates for these various situations are induced, and explores the degree to which the information diffusion diverges in a multilevel network with resolution errors as compared to a network which resolves with complete accuracy. By exploring the differences between these cases, the paper shows through statistical analysis that in the aggregate, errors are minimal, but at the node level, Type II errors can play substantively important roles in producing incorrect results, while Type I errors are largely indistinguishable from stochastic variation.

An examination of the patent networks: a peek at patent thickets from different technology classes.

Mateusz Gątkowski (Essex University), Pablo Benalcazar (Instytut Gospodarki Surowcami Mineralnymi i Energią PAN), Marek Dietl (Warsaw School of Economics), Przemysław Kaszyński (Instytut Gospodarki Surowcami Mineralnymi i Energią PAN), Jacek Kamiński (Instytut Gospodarki Surowcami Mineralnymi i Energią PAN)

The aim of this work is to review the network characteristics of different patent groups representing various technology classes. We try to find how the network characteristics and topology of the patent groups correlates with the presence of patent thickets. We present patent groups and patent thickets using Gephi visualisation software. We show how the network characteristics differ in complex and discrete industries (von Graevenitz, et al. (2013)). The purpose of this task is to identify the differences in network characteristics between patent groups prone and resistant to patent thickets. We construct the network from the data on USPTO patents, where patents are nodes of the network and citations are edges. There are around 10,000 patents in the sample. Our sample contains groups belonging to industries such as: dentistry, pharmaceuticals, chemistry: analytical and immunological testing, surgery, television, image analysis, electricity: measuring and testing, nanotechnology, bleaching and dyeing, electrolytic coating. Patent thickets have been identified by industry experts within particular patent groups.

The structures of “New” and “Traditional” exchange networks in Nain, Labrador: A multi-relational block modelling approach.

G. Robin Gauthier (University of Nebraska-Lincoln), Kirk Dombrowski (University of Nebraska-Lincoln), Bilal Khan (University of Nebraska-Lincoln), Joshua Moses (McGill University)

This paper explores the social structure of an isolated community in Nain, Labrador. Geographic isolation ensures that the community boundary is meaningful. We can reasonably assume that all the residents are known to each other, and meaningful relationships exist between them. This allows us to model the whole community system in its rich complexity. A community emerges from the relationships that are constructed and maintained through specific exchanges that constitute multiple network domains. Block modeling provides an ideal method to analyze multiple network domains simultaneously; first dividing actors into positions of structurally equivalent sets, then examining the relations between them. However, most contemporary network studies of structurally equivalent sets of actors are limited to a single network domain. This limits our understanding of how relations cumulate into social structure. This study improves upon this by applying multi-relational block models to network data collected in 2010 in Nain, from structured interviews with 330 adult residents recruited through respondent driven sampling. Data on specific exchanges was collected from 330 actors pertaining to multiple network domains: Country Food Assistance, Non-Country Food Assistance, Jobs, Housing, Household Wellness & Domestic Violence, Traditional Inuit Knowledge, Family and Alcohol Co-Use. Recruits were asked from whom they had received assistance within each domain within the previous year. The recruits could name each other (N=330), or they could name non-recruits (N=443). We partitioned the 330 actors into five positions. Actors were assigned the same position if they received assistance from a similar set of any of the 773 others, or if they had sent assistance to a similar set of the 330 recruits. We find that an actor's position in the community exchange system roughly maps on to their individual characteristics including; education, employment status, household income, age, gender and their family's history of relocation and we named the positions based on the characteristics of its members as follows (1) Upper class (relocatees) (2) Middle class (relocatees) (3) Upper class (non-relocatees) (4) Middle class (non-relocatees) and (5) Underclass. Following the assignment of actors to positions we examined the resulting role system, defined as the pattern of ties between the positions. We find that Middle class (relocatees) are central in the exchange networks that contain elements of the traditional economy. They have reciprocal relations with Middle class (non-relocatees) and Upper class (relocatees), and provide for the Underclass, and they have no contact with Upper class (non-relocatees). However, within exchange networks that contain modern elements, the only tie Middle class (relocatees) have is a reciprocal exchange with Upper class (non-relocatees). Middle class (non-relocatees) play a central role in the exchange networks containing elements of the modern economy. All positions exchange with Middle class (non-relocatees). The pattern of exchanges between the five positions suggest that the political economy of the community shapes its role system. The legacy of state-led relocation and economic inequality within the community caused by unequal returns to modernization structure which actors are appropriate benefactors and beneficiaries across exchange domains, placing the two middle classes at the center.

Are you a Settler or a Nomad? Predicting Managerial Attrition via Email Network Analysis

Peter Gloor (MIT Center for Collective Intelligence), Andrea Fronzetti Colladon (University of Rome Tor Vergata), Gianni Giacomelli (Genpact), Francesca Grippa (Northeastern University)

In this paper we describe the results of a longitudinal study whose goal was to predict managerial attrition by analyzing email communication patterns. We collected 18 months of email and analyzed social network metrics for

866 managers within a large global service company, out of which about 100 left the company in the 18 months period. Our research goal was to predict who is likely to leave the organization by looking at social network metrics such as: closeness, betweenness and degree centrality, number of nudges sent and received, communication activity and average response time. We controlled for variables such as tenure within the organization, skill, rank, months since last promotion, unemployment rate in the country, and geography. Based on the tendency of individuals to resist to changes and their degree of alignment with organizational culture, we differentiate between “nomads” -people who embrace change and are more likely to leave the organization earlier in their tenure - and “settlers” - people who value stability and are less likely to leave the organization. We suggest that once nomads make the decision to leave, there is an inner termination mechanism that makes them change their communication behavior. This mechanism converts them from “happy nomads” - managers who could potentially leave but are still committed to the company - to “unhappy nomads” - managers who have decided there is no more alignment with the company’s direction and thus getting ready to start looking for new professional opportunities. We monitored the e-mail communication of the 866 managers over 18 months, starting October 2013. We investigated the structure of each ego network and analyzed interaction frequency and network dynamics. For 40 employees who left the company (nomads) we also monitored behaviors before and after their inner termination, which led to a distinction between “happy” and “unhappy” nomads. Our results indicate that nomads can be identified by having, on average, a lower closeness centrality and by participating in more engaged and active conversations, which is demonstrated by lower mean values of “ego-nudges” and “ego-alter”. The findings also show that managers are more likely to leave when their tenure is longer. We also found that nomads, who went through an inner termination process, tend to shift their behavior by increasing their degree centrality and closeness centrality, as well as increased values of ego-nudges and alter-nudges, i.e. lower responsiveness. It is likely that managers who decided to search for new opportunities try to connect with other people in order to tap into their colleagues’ social networks to locate opportunities inside or outside the company.

Socialbots popping the political filter bubble on Twitter: network methods and theory in the context of Australian politics

Timothy Graham (University of Queensland), Robert Ackland (Australian National University)

Recent scholarship has highlighted the agential capacities of socialbots in their ability to create and foster meaningful social relations with human agents in social media networks. Socialbots are not only able to infiltrate such networks but through their activity also succeed in reshaping the discourse and structure of sub-networks. Existing studies tend to highlight the negative aspects of socialbots, construing them as problems to be controlled, governed and combated. In this presentation we build upon current research where we examine a ‘socially beneficial’ role for socialbots. This research is situated in the context of what has been conceptualised in the literature as the ‘filter bubble’ or ‘echo chamber’, whereby web users are increasingly entrapped within personal ‘filter bubbles’ that reflect back to them their already-held opinions or beliefs, and expose them to subjects they are already interested in. In this presentation we explore methods and theory for creating socialbots that could infiltrate political sub-networks on Twitter in order to propagate and promote deliberative democracy, or in other words ‘pop the filter bubble’ in highly segregated and homophilous political sub-networks. To achieve this, we draw upon social network analysis methods, graph theory, and social theoretical perspectives of technology and agency. In exploring this role for socialbots we highlight tensions and contradictions regarding ethical conduct, the agency of non-human entities, and democratic participation in social media networks where not every actor is who, or what, they may seem.

Impacting the Contagion of Cheating

Ricky Grannis-Vu (Stanford University Online High School), Rick Grannis (University of California, Irvine)

Most studies report that most college students engage in academic cheating, some quite frequently. Besides being contrary to goals of academic integrity, such behavior predicts later unethical and criminal behaviors which disrupt the marketplace. Previous work on academic cheating’s causes has focused primarily on personal characteristics and contextual factors although some research has focused on peer influence primarily through studying the implementation of honor codes. I explore a new type of intentional peer influence focused on promoting cheating rather than preventing cheating as research on honor codes has studied. Many students suggest that their peers cheat or actively encourage them to do so. To study this phenomenon, I used a highly representative sample drawn from a major public university which proved consistent in key characteristics with hundreds of other studies of student cheating. I

found that students who received suggestions to cheat proved more likely to cheat than those who did not receive suggestions to cheat and, the more suggestions to cheat which they received, the more frequently they cheated. In any academic quarter in which a student received a suggestion to cheat, they were 30.4 % more likely to cheat. On average, students cheated 0.4240 more times for each suggestion to cheat received. I demonstrate that these findings do not merely result from reporting bias by cheaters, nor from cheaters differentially associating with each other, nor from cheaters and cheating promoters sharing similar contexts and experiences which predispose them to cheat. I further show that this suggestion or encouragement induced cheating behavior spreads like a contagion through the contact network, rendering its spread dependent upon the previously established contact network. These findings suggest that a simple intervention. Asking students to limit their contact with those who encourage them to cheat or suggest that they do so could reduce the amount of academic cheating. Students were voluntarily requested to limit contact with the person who suggested that they cheat or encouraged them to cheat the most, if someone did. Preliminary findings indicate that students who did so actually cheated less than those who did not.

Twitter Conversations about ISIS: Bridging Social Capital in the Networked Caliphate

Christina Hagen (USC Annenberg School for Communication and Journalism), Joshua Clark (USC Annenberg School for Communication and Journalism)

The Islamic State, also known as ISIS (Islamic State of Iraq and Syria) or ISIL (Islamic State of Iraq and the Levant) has used social media to globally organize, disseminate their propaganda, and radicalize and recruit supporters. This work examines explicit communication about ISIS on Twitter following promotion of an atrocity the organization committed in September 2014. Using the theoretical construct of bridging social capital, social network analysis is used to identify influential actors in the network. A search term network was compared to a hashtag network in order to determine which method would provide a better understanding into what network individuals were more central to the Twitter conversation. While betweenness centrality provided similar results, eigenvector centrality pointed to different influential brokers in the two different networks.

Toward a Reference Network Cartography for the United States

Stephanie Harrington (University of California, Irvine), Emily Smith (University of California, Irvine), Carter Butts (University of California, Irvine)

Recent studies by Butts et al. (2012), Almquist and Butts (2012, 2015), Hipp et al. (2013), and Fitzhugh et al. (2015) have demonstrated the potential of simulated large-scale network structure to provide insights into phenomena ranging from crime rates to emergency communications. Central to this work is the creation of spatial data sets containing extrapolated network structure as a function of geography. Because of the computational cost and complexity of producing such social “maps,” they have thus far remained out of reach for many researchers. As a first step towards addressing this issue, we report the first steps towards the creation of a reference “network cartography” for the United States that can be downloaded and used by researchers in their own work. The information made available includes synthetic data on expected degree, tie volumes, and cohesion under a variety of pre-estimated spatial interaction functions, computed at various spatial scales. These variables can be readily used as covariates to examine the relationship of large-scale network structure to other social phenomena, as the basis for models of diffusion or other processes, as a reference against which to compare other network models, or for many other purposes.

Informing crisis communication preparation and response through network analysis: Social mediators and mediated content in airlines’ Twitter networks

Itai Himelboim (University of Georgia), Bryan Reber (University of Georgia), Yan Jin (University of Georgia)

This study tests and elaborates on the Social-Mediated Crisis Communication (SMCC) model’s key publics classifications (Liu et al., 2012) and provides practical insights to public identification for crisis communication planning and response. It applies social network analysis of Twitter data regarding key U.S.-based airlines to identifying, classifying and mapping relationships among SMCC publics. It first identifies a public as a set of social media users who are interconnected with one another more than with others, creating a silo of information flow. A cluster, then, is classified as a Direct Public if it contains the organization (here: the airline’s Twitter account) and an Indirect Public if it does not. Second, drawing upon work by Himelboim et al., 2014, this study identifies and classifies Social

Mediators, who mediate relations between an organization and its indirect publics through social media. Last, social media content is examined and classified into Siloed Content, which is exchanged among members of a public, and Mediated Content that flows across cluster lines.

Datasets of 4 weeks of airline-related activity of each airline (Alaska, American Airline, Delta, Frontier, Hawaiian, JetBlue, Spirit, Sun Country, United, US Airways and Virgin America) were collected and analyzed using NodeXL. A total of 185,046 users and 269,740 unique relationships of mentions and replies among users were captured. 282 social mediators were identified. A sample of 4,360 siloed and mediated tweets was coded for content type.

Findings indicate that each of the following user-categories made about one fifth of social mediators: individuals, users associated with the network's airline, users associated with other airlines, and celebrities. News media, the most traditional mediators, made less than a tenth of social mediators. That said, size of airline mattered. The portion of social mediators affiliated with an airline was significantly higher in the smaller airlines, while individuals and news media made larger portions of social mediators in the larger airlines. Findings also suggest that direct and indirect publics exhibited different network structures. Cluster density was found to be significantly higher in indirect public clusters than in direct public clusters, suggesting that indirect publics rely more on one another for information. This study also identified mediated content: tweets that crossed cluster-lines. Three types of content showed to be more prevalent among mediating tweets: general negative comments, airlines sponsored activities and call for action. In contrast but not surprisingly, siloed tweets were more likely to include direct interaction with the airline. Other types of content (i.e., endorsements, complaints, and informative tweets) showed remarkably similar levels of tweets percentage, across the two types of tweets. Theoretical and practical implications are discussed.

'Understanding' the Movie Trailer: A Word of Mouth Perspective

Julia Kampani (University of Bath), Chris Archer-Brown (University of Bath), Haiming Hang (University of Bath)

This study explores one of the parameters influencing word of mouth (WOM) activity within social media networks. WOM has been found to increase sales (Arndt 1967; Chevalier & Mayzlin 2006) and researchers have been exploring its antecedents in an attempt to define how it is created and shared. While advertising influences WOM (Day 1971), certain aspects of this relationship require further investigation. In response, a theoretical model is constructed to demonstrate the relationship between 'understanding' an advertising message and WOM volume/valence. Importantly, traditional work on WOM activity relies on intention scales which can often be misleading (Romaniuk et al. 2011); behavioural eWOM data are used as an alternative to validate the proposed model. Insight of this sort contributes to the methodology underlying diffusion of innovation models, and to the wider WOM marketing research community.

The film industry has been chosen as the context of this work due to its high-risk nature. Taking into account that a film's life cycle is extremely short, marketing campaigns are launched very early in advance in order to raise awareness and create buzz around an upcoming film. However, high competition and an uncertain audience reaction are often responsible for films' failure to recoup their production costs. When designed effectively, film trailers can influence viewing decision and lead to large volumes of positive WOM.

Although the volume and valence of WOM have been found to be influential in box office profitability (Liu 2006; Duan et al. 2008), WOM itself is much more complex in nature and its relationship to trailers requires in-depth analysis. The collection of eWOM data on trailer response on social media platforms and the analysis of WOM volume and valence could be useful in identifying the reasons why a few films become overly successful on opening weekend, while most fail.

Network theory is integral in explaining WOM referral activity within a social community (Brown & Reingen 1987). Thanks to the technological advancements of the past decade, eWOM has gained a lot of attention in marketing theory, and new methodological tools have been developed. In exploring the power of trailers, we demonstrated that the concept of 'understanding' what a film is about, has a complementary effect to trailer affinity in motivating consumers to engage in eWOM within a network (Archer-Brown et al. forthcoming). Drawing from network science methodologies, this relationship is further explored by extracting eWOM behavioural data from social media platforms.

Findings of this inter-disciplinary study can be of use to practitioners in the entertainment industry as well as marketers within the broader field of consumer-generated WOM.

Changes in the phenomenology of student's social network

Olga Klepač (The Institute for Social research in Zagreb), Darja Maslić Seršić (Faculty of Humanities and Social Sciences, Department of Psychology, University of Zagreb), Srebrenka Letina (Institut za društvena istraživanja u Zagrebu)

Researchers of social networks recognize the distinction between networks that represent real social interactions and the networks as phenomenal constructs - real or imagined mental constructions of social relations. In the latter - the "cognitive structure" approach, the measurement used was usually based on a respondent's recall of each possible dyadic relationship in the given network and was mostly used in studies about accuracy of individual social network perception. Recently, Mehra et al.(2013) devised a new method using stylized network images to gather quantitative data on how people "see" some specific aspects of their social worlds - "visual network scales". The aim of this study is to describe the longitudinal trends in the phenomenology of social networks in a specific context of student's groups/networks. The participants were students of psychology (N=99) and social work (N=99) at the University of Zagreb. The student's network is described as consisting of all other students that have enrolled at the same department in the same year. In this specific educational context, in their first year students choose a particular subject as their major, and are participating in the most of the courses together. We assume it makes their student's network relatively stable and it is often viewed as the closest thing to any kind of formal group membership that most students have. We used the new method to examine how the perception of their student's networks changed over the one-year time period. At both time points we measured their perception of: ego network density, ego network bridging, whole network density, and structure of whole network, their position in whole network and their preferences for having dense ego network and occupying bridging position. At the second time point the participants were additionally asked to estimate the extent of change on each examined network characteristics that happened when compared to the previous year. We hypothesized that the perception of ego density, whole network density and the tendency of individual to perceive himself as having more central position in the network will be higher in time 2 due to expected higher interconnectedness. The direction of changes was as hypothesized for all scales, but it was statistically significant only for ego density, suggesting that phenomenology of a network changes at the slow rate and that changes in personal ego network are more obvious to the individual than the changes in whole network. Somewhat contra-intuitive to the rise in ego density, at time 2 the participants reported occupying more bridging positions among their close peers than in first time point. This finding could indicate that different motives, preferences and social processes are simultaneously involved in formation of new ties. Most of the participants saw the whole network as having a clique structure in both time points. Additionally, their estimation of changes in time 2 showed a modest correlation with the difference in their scores at two time points. In the discussion, we point out the future direction for the scale validation, its criterion and construct validity.

The Use of Online Social Networks by Ethnic Community of Migrants (Case study of an online discussion forum for Russian speaking migrants in the UK)

Nina Macfarlane (Edinburgh Napier University), Robert Raeside (Edinburgh Napier University)

In the past although migrants migrated over longer distances migration flows were spatially constrained by cultural influences and the powerful attraction of migrating to pre-established networks of contacts. This was typified by flows from previous colonies to the former colonial power. Thus it became important to understand the social network side of migration in the second half of the Twentieth century, but with the prevalence of the Internet and the establishment of virtual communities the previous constraints of knowledge and the need for physical networks are becoming less important. It seems that the use of the Internet may well facilitate migration, offer reassurance and build confidence to migrants by way of knowledge and social support provision through involvement in virtual communities and it is argued will enhance the likelihood of successful migration and make those who do migrate more mobile.

Virtual networks also allow migrants to contact others of similar cultures and so maintain cultural traditions albeit virtually and so enhances their wellbeing. As modern migrant flows are often dispersed around the host country, virtual social networks may become proxy communities where they feel safe and secure amongst people in similar circumstances from a similar cultural background, offering each other information and support in the stressful environment of immigration. Informational and emotional support feature especially highly in terms of combating stress of migration and arguably allow for better integration into the host society. The paper is based on a case study of a virtual forum for Russian speaking migrants in the UK. The forum data for 2015 has been collected and analysed with a view to establish the most popular topics for discussion and ascertain what types of support such communications may provide. Social networks analysis has been undertaken to establish if there are virtual community networks being

formed on the forum. The phenomenon of online proxy ethnic communities is discussed in relation to an ethnic group of Russian migrants in the UK. The analysis of the SNA data shows that communities do exist and engage in reciprocal discussions on a number of issues notably politics, health and children's education. By constructing sociograms and analysing centrality it is evident that some actors take up positions of power in these networks which might mediate communication. It is concluded that the use of such platforms provide migrants with a powerful means of communication and knowledge acquisition as well as reaffirming their positions and giving information about their relative well-being. However, further research is required to understand the relative importance of online platforms to other social networks migrants are exposed to, as well as undertake further studies of other online ethnic communities to account for cultural differences in order to determine the role online social networks play in the process of labour migration.

Classroom Segregation Online?: Exploring Multilayered Media Networks Among High School Students

Naoki Maejima (University of Tokyo)

Many researchers have explored segregation in the classroom . However, given the recent, wide diffusion of various communication media, we have to consider the idea of multilayered media, recognizing that social networks are formed and maintained through different communication media at the same time. This study aims to break down the social network of the classroom into three layers in terms of communication media and explore how segregation occurs in each layer. I collected data from a high school classroom in Nagano prefecture, Japan. The dataset includes information about the social networks of face-to-face communication, e-mail (or instant messenger), and social networking services (e.g., Facebook, Twitter). I focused on segregation by gender, club activities, or curriculum on the ground of focus theory. I used an exponential random graph model to analyze the data and measure the degree of segregation. Four findings emerged. First, every layer showed strong segregation by gender and club activities. Second, among men, the effect of gender homophily was strongest in the face-to-face social network, followed by the e-mail and social networking services networks, in that order, and among women, it was strongest in the e-mail network, followed by face-to-face and social networking services, in that order. Third, in the face-to-face network, the effect of homophily was higher for women than for men, but this order was transposed in the social networks that were mediated online. Fourth, and the most interesting point, was that when I aggregated various layers into a single layer, fixing the value of ties to one, the degree of segregation in this integrated network became lower than that in the face-to-face network. This is because ties that did not exist in the face-to-face network but did in the e-mail or social networking services networks were very heterophilous, and they alleviated the degree of segregation. This characteristic of the ties, namely, "media-specific ties," is important because it tells us that, without considering media multiplexity, we would overestimate the degree of segregation. However, further research needs to be done. First, research that includes more dimensions of segregation, such as segregation by race/ethnicity or age, is needed. Second, the mechanism by which media-specific ties connect dissimilar people should be clarified.

Friendship network characteristics in late childhood as predictors of physical activity in early adolescence

Jennifer Marks (Deakin University), Kayla de La Haye (University of Southern California), Lisa Barnett (Deakin University), Steven Allender (Deakin University)

Purpose The aim of this study was to examine whether physical activity characteristics of personal networks in late childhood are associated with physical activity behavior in early adolescence. **Methods** Objectively measured and self-report physical activity (PA) data were collected from 308 students (age 11-13 years), recruited from 15 primary schools in Victoria, Australia. Data were collected from the same participants the following school year (5-8 months later). Fifty percent of students transitioned to a different school environment between study phases. At time 1 (baseline), participants described characteristics of up to fifteen friends, including whether participants usually played sport with their friends, and participants perceptions of 'how active' their friends were. Regression models were fit to test whether baseline network characteristics predicted PA behavior of participants at time 2. **Results** For males, having a higher proportion of very active friends at time 1 was predictive of more time spent in moderate to vigorous physical activity (MVPA) at time 2. Also for males, having a higher proportion of friends to play sport with at time 1 predicted an increase in PA intensity during school recess and lunch breaks at time 2. For girls, having a higher proportion of friends to play sport with at time 1 was predictive of more time spent in MVPA after school and on

weekends at time 2. Conclusion Friendship network physical activity characteristics in late childhood have lasting effects for engaging in physical activity in early adolescence. Participating in physical activity with friends in late childhood is influential for longer term PA behavior.

Health and Familismo: Social Network Discussion of Oral Health Problems among Immigrants of Mexican Origin in the USA

William R. McConnell (Indiana University Bloomington), Gerardo Maupome (IU School of Dentistry, IU Network Science Institute), Brea L. Perry (IU Bloomington, IU Network Science Institute), Eric Wright (Georgia State University)

Latinos/as are one of the largest ethnic minority groups in the USA, with people of Mexican origin (Mexican Americans, MAs) making up about two thirds of Latinos/as. MAs are often afflicted by poor oral health and limited access to dental health care services. Scholars often ascribe a collectivist cultural orientation called familismo to MAs; this kin-focused value system should moderate oral health beliefs and behavior but it is rarely examined from a social network perspective. In this paper we use egocentric network data from the TalaSurvey Study, a survey conducted in an urban community of adult MA immigrants, to examine the influence of kinship ties and acculturation on oral health behaviors. Through snowball-based sampling and interviews we identified alters in egos' personal networks. Egos stated whom they talk with about Oral Health Matters (OHM), and how often they discussed dental problems in the preceding 12 months. We employed egocentric network analysis in order to (1) describe the OHM networks and (2) identify the ego, alter, and network-level variables that characterize supportive network members when oral health problems arise. We interviewed 332 egos (90% born in Mexico); egos named ~3.9 alters in their networks (1,299 alters total). Consistent with collectivist orientation, kin were most often leveraged to discuss oral health problems, although egos also relied on individuals whom they perceived to have greater than average knowledge about dental matters. However, reliance on alters' knowledge decreased among egos with greater behavioral acculturation. The egocentric network perspective offers a detailed description of the structure of OHM networks including kin, fictive kin, peers, and health professionals. We applied this perspective to develop a network-based conceptualization of familismo among MAs, quantifying the nuanced mechanics of oral health discussion in an MA community.

Who Helps Whom? : Longitudinal Network Analysis of Helping Behavior at a Community Union in Japan

Shinya Obayashi (University of Tokyo), Michihiro Kandori (University of Tokyo)

We present a longitudinal network analysis on labor unions to examine the validity of various theoretical possibilities suggested by the existing literature on the mechanism of human cooperation. The union we studied is one of the individual-affiliate unions in Japan, so called, community unions. The community unions are loosely knit organizations that have a very high turnover rate of members. They seem to have a small amount of social capital. Many of the existing literatures argue that it is difficult to help each other in such loosely knit organizations. However we found by field works that members help each other at their protest activities whose structure is characterized as generalized exchange. What mechanism functions in the community unions? In order to solve this problem, Obayashi (2013) and Kandori and Obayashi (2014) presented the overlapping generation repeated games on helping behavior in community unions. The former is perfect information game while the latter is imperfect information (private monitoring) game. The former explains the helping behavior as indirect reciprocity with reputation mechanism (A helps B because B has a good reputation) while the latter explains it as indirect reciprocity with belief-free mechanism (A helps B because A and B met together at the third party's protest activity). Which mechanism is more valid? Otherwise is any other mechanism such as direct reciprocity more valid? We clarify it by longitudinal network analysis. We collected the data from the Tokyo Managers' Union, which is one of the community unions. The data we collected contains who helped and who were helped in all of the protest activities between October 2014 and September 2015 (the number of protest activities is 317). We carry out two types of analysis. One is the relational event modeling (REM) approach proposed by Butts (2008) and the other is the stochastic actor oriented modeling (SAOM) approach proposed by Snijders et al. (1996, 2001). The former approach is an application of event history analysis and lose less information because the unit of analysis is each event. The latter approach is more flexible in view of network statistics and being able to model structural zeros, but lose more information because we have to aggregate events into a certain unit (i.e. every month). These analysis are undergoing. We will show the results and their comparison in the presentation and show which mechanism is valid in the community union.

The relationship between African American women's health discussion networks & illicit drug use

Carrie Oser (University of Kentucky), Kate Eddens (University of Kentucky), Erin Pullen (Indiana University Network Science Institute), Brea Perry (Indiana University), Richard Crosby (University of Kentucky)

Aim: HIV is an epidemic in the African American community, where personal relationships are salient and can influence health behaviors. Yet, there is limited research examining egocentric social networks and African American women's HIV risk behaviors. This study examines the relationship between African American women's health discussion networks (size, composition, strength, and function) and the HIV risk behavior of illicit drug use. **Methods:** Using data from the Black Women in the Study of Epidemics (B-WISE, $n=344$), multivariate modeling investigated associations between characteristics of health discussion networks and screening positive for one of the following drugs: amphetamine, methamphetamine, benzodiazepine, cocaine, or opiates. **Results:** The average participant was single, 35 years old, and the number of health discussion network members ranged from 0 to 5, with 22% having no one to talk to about their health (mean=1.39, S.D.=1.10). African American women were less likely to use drugs when they reported larger (AOR=.71; 95% CI: .55-.92) or closer (AOR=.79; 95% CI: .68-.92) networks, as well as those comprised of people who provided a variety of support functions including instrumental (AOR=.52; 95% CI: .31-.88) or financial (AOR=.59; 95% CI: .34-.99) support, health information (AOR=.44; 95% CI: .25-.78), and discussing health (AOR=.51; 95% CI: .28-.90). **Conclusion:** It is concerning that almost one-quarter of women had no one to talk to about their health considering that larger, closer-knit, and more supportive networks are protective against illicit drug use for African American women. Risky sexual behaviors are challenging to change, which is problematic as illicit drug use impairs judgement and most new HIV infections among African American women are acquired via heterosexual contact. Future research should examine the characteristics of African American women's health discussion networks as predictors of drug treatment and include health discussion networks in HIV interventions. This research is funded by NIDA (R01-DA022967 & K02-DA35116, PI: Oser).

The Internationalization of Scientific Knowledge Creation: Network Analysis of Sociological Collaboration

Crystal Peoples (Duke University)

World society theory posits science is a world institution, as evidenced by the recent rise and expansion of scientific influence and the standardization of scientific knowledge creation throughout the polity. With the rise of scientific authority, countries in the modern world polity must increasingly depend on science for legitimization. This includes not only using science to make decisions, but also being at the forefront of new scientific knowledge creation. With the increasingly connected world polity, therefore, rapid growth of international collaboration in scientific disciplines would be one suggested product of such a system. Additionally, work in the sociology of knowledge has suggested that scientific collaboration networks affect scientific practice. Thus, uncovering trends in international collaboration becomes an important sociological question. Using citation and bibliographic information from articles in a sample of sociology journals, I create international co-authorship networks at the country level. First, I find increases in the number of internationally co-authored papers across these journals over time. Using core-periphery analyses, I find that the collaboration networks indicate a core set of nations (largely democratic, Protestant, and Western) at the center of the creation of sociological knowledge. This pattern is consistent with results predicted by world society theory and suggests that these nations are disproportionately setting the global agenda of sociological research.

Professional Social Network Analytics for Enterprise Management

Weining Qian (East China Normal University), Gopakumar Gopalakrishnan (Infosys Ltd.), Cheng Ding (East China Normal University)

Large enterprises have huge amount of internal operational data and documents such as human resource records, project management documents, work emails, and instant messages that explicitly or implicitly represent networks between employees. In comparison with public social networks or those derived from social media, such professional networks among employees are usually more dense in specific areas such as professional skills, project co-assignments, and frequent interactions. Analysing these networks are important for enterprises to strengthen organizational effectiveness. But there are several technical challenges in deriving and analysing professional social networks within the

enterprise. The first one is how to construct the network from multiple internal databases of the enterprise. The second challenge is management of the large volume of graph data feeds from multiple operational databases. It is important to note that the data is heterogeneous and fast-changing and they cannot be stored or managed in any single database management system. The third challenge is that the output of analytics should serve multiple users who have different requirements. For instance, an employee would expect the system to help establish a new social connection while a manager expects it to help identify the structure of interactions occurring between various geographically distributed teams. In this presentation, we introduce preliminary version of a professional social network analytics system and discuss technologies used to address above mentioned challenges. We highlight the similarities and differences between professional network analytics within enterprises and analytics of public social networks crawled from the web. Further, we report preliminary professional networks derived from a multinational enterprise and suggest future work directions.

Older Adults Networking On and Off Digital Media: Initial Findings from the Fourth East York Study

Anabel Quan-Haase (University of Western Ontario), Kim Martin (University of Western Ontario), Meghan Miller (University of Western Ontario), Barry Wellman (NetLab Network), Christian Beermann (University of Toronto)

This is the first report of the fourth East York study, a predominantly qualitative analysis of how adult residents of this Toronto area find social support via the internet, their phones, and in-person. We focus on those East Yorkers who are 65+: they comprise nearly half of the sample. Despite advances in digital media, we find that the second East York study's analytic categories remain useful. Social support is widely available, with these older adults using the internet, their phones, and in-person contacts to exchange it. There is much reliance on relatives, some on friends, and scant on neighbors—who remain in nodding relationships. Given that many older adults have less familiarity with the internet, they rely extensively on relatives and friends for guidance on how to use it. Email, especially, and Facebook are the most widely used communication media.

Social ties and physical distance

Adam Roth (Washington State University)

Although the deterministic factors of spatial configuration have been studied in relation to social interactions, minimal focus has been placed on geographic distance. Those who have acknowledged distance typically discuss its theoretical implications. The present paper offers a unique empirical examination of physical distance and its relation to social tie formation. In analyzing core discussion network data of the Maasai people of northern Tanzania I avoid the problem of controlling for the mitigating effects modern technology has on distance and social interaction. Ultimately, I find that a majority of ego ties are located within close physical proximity. Those alters situated far away often possess desirable qualities that provide the ego with sufficient motivation to expend additional energy and transcend distance.

The role of personal networks of support in preventing breast cancer

Alicia Saldivar (Universidad Autonoma Metropolitana, Iztapalapa), Carlos Contreras-Ibáñez (Universidad Autónoma Metropolitana, Iztapalapa)

Breast cancer is one of the most common death causes in women of productive age all over the world. In Mexico, about 12 women die each day because of breast cancer. However, institutional media campaigns to raise public consciousness about the importance of early detection, have not yet reached the desired effects. To detect breast cancer in an early stage, breasts self-examination is among the most recommended practices for women of all ages. Unfortunately, only about the 30% of all Mexican women explore their own breasts to detect tumors. In this regard, although specialized literature suggest that social support networks are associated to better practices of health self-care, we consider that there is a lack of a more precise comparison of social support sources, the gender of them, and type of support provided, for women that realize self-exploration and those who not. This is important for two reasons; first, can help to suggest more effective channels for intended social change. Second, a better understanding of the social environment of the decision of breast self-exploring, should contribute to unveil resistance forces opposing behavioral changes in women's health related issues. The aim of this study was to describe and compare the composition of personal networks of social support for an intentional sample of 80 women in productive

ages, taken from the general population of Mexico City. We use a name generator for up to 10 alteri which asks about the closest relationships and the type of social support received from them: listening, counseling and advice, material resources or money, support in scholar or work related issues, to spend free time together, empathy, and answers to health questions. Network sizes, dyadic and triadic censuses, and composition by sex and by relation, among other indices, were calculated for each case, and sample statistical associations were obtained for woman reporting breast self-exploration and those not doing so, and modeled using a logistic regression for check the relative contribution of those social circumstances. Initial findings show that one of the most important person to our participants were their mother, in almost all the forms of social support we have asked for. As we expected, they also mentioned their sisters, their female friends, and other women in their network. Interestingly, they included their fathers (mainly as money providers), brothers, and other male friends which function were to talk about private issues, or to provide general advice for life problems. Further multivariate analysis are to be shown and discussed against the hypothesis of social selection being the main resistance to change in the case of breast self-exploration in Mexican women.

Foul-Weather Friends: Failure Tolerance in Organizational Networks

Jessica Santana (Stanford University)

This study proposes that relational cohesion moderates the effect of endogenous (organizational) failure on network tolerance of failure. While failure is an analytically challenging topic, the study is important because failure might play a key role in a network's innovativeness. Previous literature has evaluated structural cohesion as a factor in some network maintenance, but results have been contradictory. We propose refining the social psychological concept "relational cohesion" using behavioral (rather than self-reported) data and applying it to inter-organizational networks. We expect relational cohesion to explain why some organizational exchange networks tolerate organizational failure, while others do not. The article closes with a suggested empirical analysis of the proposed theory.

Exploring social networks within a web and app based intervention for weight loss.

Sharon Anne Simpson (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow), Juliana Pugmire (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow), Lynsay Matthews (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow), Laurence Moore (MRC/CSO Social and Public Health Sciences Unit, University of Glasgow)

Background: The internet and social media can be effective in influencing behaviour, and can reach large numbers of people. Previous research shows that setting goals, making plans and self-monitoring is important to facilitate behaviour change. However, the support of family, friends and others is crucial in helping people to achieve and sustain healthy lifestyles. We have developed a web and app based intervention to promote health behaviour change employing three key facilitators: goal setting, self-monitoring, and social support. The social support element is key and individuals will identify 'helpers', individuals from within their current social network, to help them to achieve their goals and change behaviours in relation to diet, physical activity and weight loss.

The aim of this study is to examine the association between the participant's social network (e.g. number and characteristics of alters, types and quality of relationships, network density) and success in their achievement of goals like losing weight, increasing physical activity, eating more healthily. Other questions of interest include; do the networks change pre and post intervention, and if so, how? Does success depend more on the helpers or the broader ego network? What are the characteristics of the helpers and are they different from the broader ego network? Are outcomes related to particular helper characteristics or helper engagement?

Methods: Trial methods: Participants will be adults aged 18-70 with a BMI $\geq$ 30. In the feasibility randomised controlled trial, 120 participants will be randomised in a 2:1 ratio; 80 participants will be allocated to receive the Helpmedoit! intervention and 40 to the control group who will receive a leaflet on healthy lifestyle.

Social Network Analysis methods: This is a mixed methods study. We will ask participants to identify from their social network which individuals they are going to nominate as 'helpers'. Using Vennmaker software we will then ask participants to draw up to ten people in their social network with whom they have most contact. Participants will then be asked to complete an egocentric network questionnaire only for the nominated helpers. We will also interview participants and at least one of their nominated helpers. Interview data will be analysed using a thematic approach and will provide a rich source of information on the characteristics of the individual's ego networks. Data from the

interviews will be combined with the quantitative data to allow a thorough exploration of the ego networks of the participants and the impact of these on behaviour change success or failure.

Results and conclusions: This paper will present the protocol for this novel study. The social network analysis will provide insights which will be useful for the design of a future definitive trial, as well as shedding light on the impact of the participant's ego network structure and content on the intervention effects and conversely how the intervention affects individual ego networks.

The Social Networks of Cyber Aggression on Twitter

Glenn Sterner (The Pennsylvania State University), Diane Felmlee (The Pennsylvania State University)

This project applies a social network perspective to the issue of cyber aggression, or cyberbullying, on the social media platform Twitter. Bullying is a national, pervasive issue that has been identified as a serious, social problem in the U.S. and elsewhere. Bullying represents a type of aggression that can take various forms, such as physical, verbal, and relational. The newest genre of peer aggression now takes place through the use of digital or online means. Cyber aggression is particularly problematic because of its pervasiveness, its potential for anonymity, and the ease with which so many others can join the harassment of victims. The website platform Twitter, which is an online social networking service in which short messages can be read or sent, represents a particularly highly utilized forum for Internet aggression. The CEO of Twitter has recognized this issue, and has indicated the company is ill-equipped to handle this negative, pertinent activity.

Extensive research has focused on adolescent cyber aggression and its highly problematic consequences such as self-harm and suicide. However, this issue affects more than adolescents and likely extends significantly beyond high school to affect both young and older adults, although these populations receive less attention in the literature. Additionally, little is known regarding mechanisms that can aid in reducing instances of cyberbullying. Companies such as Twitter are especially interested in learning how to mitigate this harmful behavior.

In order to fill gaps in the literature, therefore, we present results from a study that examines cyberbullying on the social media website of Twitter. Our study's goal is to analyze and visualize patterns in the social network flows of incidences of cyber aggression on Twitter. We examine the following research questions: How do aggressive tweets spread through the networks of users of Twitter? What is the role of strong versus weak ties in the dissemination of aggressive messages? How do users respond to such harmful tweets? What tactics do users appear to pursue in an attempt to stop aggressive tweets (e.g., stop responding, retaliate)?

This paper analyzes several instances of the spread of aggressive Tweets through social networks. In one example, a Twitter message targeted a woman with derogatory statements. In this instance, we see the victim defending herself in a tweet, and then her network, primarily her weak ties, responding by retweeting her message to mitigate the cyberaggressor. We examine responses of users to aggression and the mitigation tactics utilized by users through network and content analysis of the tweets. Our research demonstrates the utility of social network analysis in pinpointing the role of social networks in the dissemination of harmful, aggressive Twitter content. However, it also showcases the potential for social networks to assist in stemming the spread of such negative messages.

Directors' Brokerage Behavior and Career Outcomes During A Merger Process

Wookje Sung (University of Kentucky)

This study examines relationship between directors brokerage behavior and their career outcomes during a merger process, particularly, promotability assessment scores and being laid off. Unlike most previous research on brokerage, arguing that being in a broker's position is advantageous for individual career outcomes, I argue that directors' brokerage behavior may not always help them receive positive career outcomes (e.g. higher promotability and not being laid off during turmoil) for two reasons. First, given that mergers often fail because of integration failure, top priority of directors in a merged organization should be to bring together the same department from two different previous organizations, not to keep them apart, i.e. brokerage. Second, not only directors' brokerage behavior, but also their strategic orientations (here, I used *tertius gaudens*, brokerage orientation that keeps others separated, and *tertius iungens* that brings others together) can affect their career outcomes because brokerage positions can change over time according to their strategy. With a dataset including 137 directors in a recently merged organization over two years, I find that 1) there is no significant direct main effects of directors' brokerage behavior on their career

outcomes, and 2) directors' promotability is higher when they had low brokerage score between previous organizations but within the same department (between legacy and within department brokerage) in the past and their current effort to bring others together is low at the same time, 3) when they have high current between legacy and within department brokerage score and their current effort to bring others together is high, and 4) when they put more effort to bring others together in the past, and have low current brokerage score within the same previous organization but across different functions. These results suggest that 1) directors' brokerage position may not always be advantageous not only for organization, but also for individuals, 2) that organizational boundaries may have important effects in determining brokers' benefits, and 3) that individuals' relationship strategy may play complementary roles of brokerage position.

Using PageRank to Rank Teams in the National Hockey League

Nathan Swanson (United States Military Academy), Donald Koban (United States Military Academy)

The National Hockey League consists of 30 individual teams that interact as they compete with each other in various games throughout the season. If these interactions between pairs of teams are thought of as a complex network, it is possible to apply network science approaches to determine which teams are most important in the league. PageRank is the network based algorithm that spawned Google and its ranking of webpages. PageRank has consequently been applied to sports to rank teams. The algorithm, however, has not yet been applied to hockey. This paper presents a PageRank based method to rank National Hockey League teams in order to predict the winners for each round of the Stanley Cup Playoffs. This approach models the standings for an 82-game regular season as a directed, weighted network. The nodes represent teams and edges either represent wins and losses between teams or the goal differential between teams. Both edge structures are modeled, compared, and the best edge structure is presented. The motivation for a networked approach is to develop ranking that are not based solely on the number of wins a team has, but instead on the number of wins against quality opponents. PageRank offers more meaningful insight than conventional analysis of wins and losses by weighting those wins and losses based on the quality of opponents. To further optimize the use of PageRank, the method also uses various traditional statics such as goal differential or goalie save percentage to bias the PageRank rankings. The results are analyzed to quantify the confidence of each prediction and PageRank derived rankings are compared with existing ranking algorithms. The desire is to demonstrate the usefulness of PageRank and network science in sports rankings by demonstrating their usefulness in the sport of hockey. The utility of network science in sports analytics is untapped and holds many insights for discovery. The demonstration of PageRank as a highly effective ranking system in the NHL to predict postseason success is an example showing the power of applying network science to sports.

The role of design thinking in social network analysis research

Colleen Syron (University of Nebraska Lincoln), Melissa Welch-Lazoritz (University of Nebraska Lincoln), Kirk Dombrowski (University of Nebraska Lincoln), Colleen Syron (NA)

In July of 2014, the National Institute for Drug Abuse (NIDA #RO1DA037117) awarded Dr. Kirk Dombrowski (PI) the grant, "Injection Risk Networks in Rural Puerto Rico." This five-year grant investigates the social network contexts of HIV and Hepatitis C infection in four rural communities. The project is broken into three phases: the collection accurate rural network data, building & testing simulations to identifying the most effective prevention methods, and ultimately implementing these intervention strategies among injection drug users to stop the spread of HIV and Hepatitis C in Puerto Rico.

We believe the success of this grant could potentially lead to a harm reduction plan and methodology that can help stop the spread of HIV and Hepatitis C across the country. Furthermore, the success of this grant could potentially serve as evidence of how design thinking can contribute to greater overall success and impact in every stage of a research project.

Communications design is typically included in project plans as an element of the final "translation" and "dissemination" stages. As data sets get larger, fields like Data Visualization have become more popular as a means to include design in "translation". This poster session paper will attempt to demonstrate how design can play a roll in each phase of a grant for greater impact to a larger audience with more emotional attachment.

This poster session paper will explain the role design thinking has and will continue to play in a large, multi-year healthcare grant. Starting with the overall communications plan developed for the grant, the paper will provide in

depth explanation of selected communication channels (i.e. blogs, websites, brochures, YouTube, animation, presentations, academic papers, art galleries, outdoor signage), as well as how each of these is intended to target a full range of audiences (i.e. fellow academic researchers, National general public, local public awareness, medical providers, government, legislative leaders, journalists, and community advisors).

Network Dynamics of the Structural Setup of Students' Networks

Lisa Thiele (Technische Universität Braunschweig), Nils Christian Sauer (Technische Universität Braunschweig), Martin Atzmüller (University of Kassel), Gerd Stumme (University of Kassel), Simone Kauffeld (Technische Universität Braunschweig)

Analyzing the evolution of social networks, how network structures change over time, and how this is related to outcomes broadens the understanding of organizational psychology. The similarity of actors' attributes have been shown to be crucial for the formation of subgroups. People tend to identify with others who are similar to them on attributes such as age and nationality. Especially attributes that are salient, such as gender, result in the formation of homogeneous subgroups. However, frequent social interaction reduces the salience of demographical attributes. Meanwhile, psychological differences, such as values, personality, and attitudes get more important for the groups' social integration over time. Therefore, individuals should also interact and prefer others who are similar to them in regard to psychological characteristics. Moreover, previous research points out that top performers with high human capital occupy central positions in networks. They tend to have a high betweenness centrality and fill structural holes, which provides them with diverse resources and allows them to control the flow of information between network components they link. However, little is known about the dynamic causal aspect of this phenomenon. Thus, the question arises whether top performers get into central positions because they carry the most human capital or whether they become top performers because of their initial network position instead. In order to fill these research gaps, this study examined the structural setup of a complete student cohort at three measurement points, starting at the very beginning of their composition at the introductory course and following them along their bachelor studies. The sample consists of 73 psychology undergraduate students of a German university, representative in gender and age distribution (82% females and an average age of 22.2 years in the range of 18 to 47 years). We were able to follow the cohort without any subject defined dropouts. Instead, network leavers and joiners were due to study withdrawal or changing the place of study, respectively (T1 at the end of the introductory course with $n=68$, T2 at the end of the second semester with $n=70$, T3 at the end of the fourth semester with $n=63$). First results reveal a tendency for age and gender similarities to reduce slightly over time in favor for more age and gender diverse subgroups. However, we find no remarkable changes in the composition of subgroups neither regarding personality traits nor regarding values and attitudes. Further results hint at a causal relationship of performance and betweenness centrality over time, such that higher values of initial betweenness are associated with higher performance later on. By contrast, medium-term performance is associated with higher subsequent betweenness values. Moreover, we find positive relationships of initial betweenness with students' perceived fit and academic self-concept.

The Paradox of Popularity: Do Popular Groups Foster Community Development?

Alexandra Toll (University of California, Irvine)

Research on social networks attributes the formation of strong ties to actors' purposive attempts to prosper, their friends' efforts to facilitate connections, and chance encounters in shared social settings. Although strong ties are typically formed in shared settings, we know little about the characteristics of settings that attract and retain people. Meanwhile, the Internet has broadened the search for settings. As people turn to the web and look for social settings to join, simple, searchable features— notably location, interest, size, and age —guide their choices. Whether such features are most helpful for establishing meaningful social relations has not been empirically tested. Using unique data on participation in online communities, we explore the characteristics that attract members and the features that aid in their retention. We find that, although prospective members seek large and established groups when searching for organizations, such groups are less likely to foster community through repeated participation. We conclude with recommendations to social media outfits and their users about organizational practices that are conducive to community development.

Egocentric Network Characteristics and Disaster Preparedness in Rural Japan

Shigeki Toyama (Kochi University / Northwestern University)

In Japan, after the 2011 Tohoku earthquake and tsunami, the preventive actions toward a natural disaster become a serious issue both individuals and communities of a rural area where contiguous to nature. This study uses social network analysis to examine the predictors of the disaster preparedness. The author conducted the social survey at Kuroshio town, Kochi Prefecture, Japan in 2013. Kuroshio town is the rural place where the Japanese government reported in 2012 the highest estimate of the tsunami of 34 meters in the simulation of Nankai Trough earthquake. The social network data (three types of network, a close relation, retrieve local information, and consult disaster prevention, were asked) and demographic attributes, as well as media usage data, were collected from the 209 residents. By reviewing the previous study (Heller et al. 2005; Sattler et al. 2000; Hurlbert et al. 2000), the author hypothesized the predictor variables for the disaster preparedness with ego-net measures, demographic characteristics, and communication behaviors. In ego-net measures, the author hypothesized that individuals who are embedded in a larger and more cohesive social network would take more preventive actions than the others that are embedded in a smaller and disperse network. The other hypotheses are presented as that the older individuals with higher education and higher income, living with their family members tend to be more prepared for a disaster than the others who are younger and only attain a lower education and revenue. As the additional hypotheses, individuals who are high interest in local communication will access more knowledge on risks of natural hazard and will be more prepared. Ego-net measures and hierarchical multiple regression were calculated on the predictors of disaster preparedness. Results support only a few of the hypotheses related to ego-net measures. Unexpectedly, an essential ego-net measure such as network size and density are not significantly associated with the disaster preparedness. Instead, ego-net measures of an Index of Qualitative Variation (IQV), a proportion of men in alters, and EI Index on kin relation are identified as the predictors. Also, the results show that Age and Living with a Family, as well as media usage of radio, cellular phone, and a reading habit of a publicity paper issued by the local government, are the predictor variables for the disaster preparedness. Being able to identify resilient individuals as well as vulnerable toward a natural disaster with those predictors will be beneficial to the community leaders and the local government for planning and diffusing a disaster prevention.

Network locations and political orientations in Japan

Ryuhei Tsuji (Shinshu University)

Let us begin with some rough examples of relations between network locations and political orientations. Those who interact mostly with others in their local community may be narrow-minded. Since they may want to give more benefit to those in local community, they may not support egalitarianism. On the other hand, those who have acquaintances abroad such as business persons working in a global enterprise may support libertarianism and multi-culturalism. Here I examine the idea whether there are relations between network locations and political orientations. A questionnaire was sent to 2000 people in Nagano prefecture in Japan on September, 2015; 1140 out of 1914 were collected (86 were unreachable or else). In the questionnaire, a set of "geographic generator," which measures the numbers of others who fell into the 20 categories that consist of 5 social relations and 4 geographic locations, was used. The 5 social relations measured were "those who helps me daily," "those who take care of my children or old parents," "those whom I consult with when needed," "those whom I talk with on local and social issues or politics," and "those whom I often play with or hang around with." The 4 geographic locations measured were "those who live in the same city/town/village," "those who live in the same prefecture," "those who live in Japan," and "those who live abroad." And in each social relation, "family or relatives" and "friends or acquaintances" were asked separately, which goes up to 40 categories altogether. By factor analysis-like method, I summarized the 40 categories and combined into 6 categories. In addition, a set of political orientation scales were developed. The scales include 8 scales such as libertarianism (aspect of tax cut), libertarianism (aspect of free market), liberalism, social democracy, egalitarianism, assimilationism (cultural conservatism), liberal multi-culturalism, radical multi-culturalism. Some relevant scales such as general trust, tolerance, patriotism, purism, and xenophobia were asked. Then, I calculated the correlations between the 6 network categories and the political orientations. Some results are shown as follows. The number of family/relatives located in the same city or prefecture who help them daily basis is negatively correlated with egalitarianism. The number of friends/acquaintances located in the same prefecture or in Japan with whom they consult, talk about social issues, or hang around is also negatively correlated with egalitarianism. The number of family/relatives located outside the prefecture but in Japan with whom they consult, talk about social issues, or

hang around is positively correlated with liberal multi-culturalism, and negatively correlated with xenophobia. The number of the same kind abroad is also negatively correlated with xenophobia. The number of friends/acquaintances abroad with whom they consult, talk about social issues, or hang around is positively correlated with libertarianism (both tax cut and free market), and positively correlated with radical/liberal multi-culturalism. Overall, the relations located relatively close to them is related to we-feeling and it may be the origin of anti-egalitarianism as I exemplified at the beginning. On the other hand, friends/acquaintances abroad diminish xenophobia and raise the sense of multi-culturalism.

Convolutional Neural Networks and SNA – match made in heaven?

Maksim Tsvetovat (Open Health Network), Sofia Dokuka (Higher School of Economics), Diliara Valeeva (Higher School of Economics)

A central research question of SNA can be generalized as “what structural properties in network X are connected to node or edge attributes Y and Z?” This research question can be inverted (attributes leading to structural properties) or permuted in other ways, but the essence remains.

The leading methodology for answering this kinds of questions has been exponential random graph models (ERGMs) – however, as many practitioners will admit, the algorithms are fraught with issues. Running ERGMs on larger networks is taxing, and many real-world networks with hundreds of millions of nodes (e.g. Twitter) are computationally intractable. Even so, on smaller networks ERGMs frequently do not converge. Using ERGMs on complex multimodal/multiplex graphs has been a challenge as well.

In essence, ERGMs are “feature-matching” algorithms – the model of the graph is built from measuring descriptive statistics on a set of graph features (stars, triangles and more complex shapes). The complexity of the graph features has been largely limited by having to solve graph isomorphism many times in a row, a problem that *may* be NP-hard.

A new crop of algorithms has recently emerged from the image recognition community called “Convolutional Neural Networks” (CNN). Using multiple (sometimes 100s of) hidden layers in a neural network, CNN's act as both feature-matching and feature-generating systems, automatically learning image features and building a classifier to detect them.

CNN's have taken the computer vision community by storm, and are rapidly taking over the natural language processing duties.

In this presentation, we will show our first attempt at adapting CNNs to operate on social network data. We use the algorithms to tackle two difficult problems on large SNA datasets – influence on Twitter (i.e. predicting number of retweets given structural properties of the author and content of the tweet), and predicting chances of a startup company going public based on structural properties of their funding network.

The impact of homophily and multiplex networks on the assembly of teams

Marlon Twyman (Northwestern University), Leslie Dechurch (Georgia Institute of Technology), Noshir Contractor (Northwestern University)

Collaboration and teamwork are increasingly a prevalent and necessary part of society at large. Complex problems require interdisciplinary teams to combine disparate knowledge. Although complex problems require diversity, human nature shows a general preference toward homophily. This creates a fundamental tension in team assembly. In choosing teammates, the individual must balance an attraction to the familiar with an often competing need for expertise variety. This paper explores the implicit rules individuals use in choosing teammates.

We do so by observing teammate selection in a web-based team assembly platform called My Dream Team (MDT). We used MDT to help 213 individuals from two different organizations assemble into 5-7 member interorganizational-interdisciplinary teams. They used MDT to identify potential teammates that match their preferences, invite them to form a team, and respond (accept or decline) to invitations they received from others. The invitation and response messages were used to generate networks representing these different steps in the team assembly process. The structure of the directed invitation and response networks provide valuable insights into the mechanisms, like homophily, that influence the assembly of teams.

Using exponential random graph models (ERGM) of the invitation networks, we test the extent to which theories of homophily (similar attributes) and multiplexity (prior ties) influence the team assembly process. We tested the influence of homophily along three different dimensions: discipline (H1a), gender (H1b), and age (H1c). We also tested hypotheses for two forms of multiplexity: prior friendship (H2a) and enjoying working previously (H2b) with the person. ERGM analyses did not support homophily effects on discipline, gender, or age. However, ERGM analyses supported the role of multiplexity in team assembly. Individuals were more likely to invite their friends ($OR = 27.1$) or people with whom they previously enjoyed working ($OR = 28.2$). In this talk, we also present findings examining homophily and multiplexity mechanisms in the team invitation response networks (i.e., acceptance or rejection ties) and the role of individual characteristics, such as personality traits, on homophily- and multiplexity-based team assembly.

These findings that individuals do not use homophily but rely on existing networks when choosing teammates may evidence a functional strategy by individuals whereby basic needs for predictability are met not by choosing to work with similar individuals, but choosing to work with known individuals. Using multiplexity instead of homophily to ensure predictability in one's teammates is potentially beneficial to the resulting diversity of the team. However, given research on the value of newcomers, this assembly strategy may hinder team creativity and minority dissent.

Images of Social Capital

Christian Waldstrøm (Aarhus University)

Since its conception, the term social capital has spread into a wide number of fields, such as linguistics, business, public policy and social work. As often happens with concepts adopted by scholars and practitioners from such diverse areas, the concept of social capital has become fragmented in not only its definitions and applications but also its underlying metaphor. While some images of social capital highlight the social network itself, others focus on the process or the outcome of having social capital. This presentation will disentangle the many faces of social capital using a variety of metaphors.

Industry Cluster: Analysis of Web 2.0 Data to Support the Strategic Cluster Management

Julian Wilberg (Technical University of Munich), Daniel Kammerl (Technical University of Munich), Udo Lindemann (Technical University of Munich)

Engineering companies are under high competitive pressure because the market demands for higher product quality, shorter development cycles, and lower prices. At the same time the globalization allows new competitors to enter markets. Therefore, companies are forced to increase their effectiveness and efficiency in order to stay competitive. Different approaches exist to address the challenges mentioned afore. One of those promising strategic approaches is the formation of industry clusters because research showed that such clusters can help to increase the productivity, foster innovation, and support the development of new businesses. In general, industry clusters are a geographic concentration of companies from the same field, which allow companies to increase their competitive edge. The research for this work was conducted in a cooperation with a German industry cluster that consists of more than 100 partners from industry and research. Due to the fact that the cluster consists of many different partners, the cluster management decided at the beginning to establish a Web 2.0 platform to foster collaborations, innovation, and new business ideas. The platform is an important enabler for the overall success of the cluster and therefore the objective of this research was to analyze and evaluate the target achievement. Based on the gained insights recommendations for the strategic cluster management were derived. Therefore, the provider made the user data of the platform available for our research. The provided data was then analyzed using different metrics from the field of social network analysis and structural complexity management. The metrics were used to evaluate the connections among the users and groups. Furthermore, additional data was used to analyze the connections among different industry sectors and regions. Besides analyzing the data sets from a structural perspective also the development of the cluster over the time was evaluated. Overall, the analysis revealed that the industry cluster was growing constantly over time and gained new users. However, metrics like the network density showed that newer users were less integrated in the virtual network. In addition, the analysis revealed that many users were not as active as desired. Based on the various insights, different campaigns were initiated to stimulate the user's activity and growth. Summing up, using social network analysis metrics is very useful to analyze the data from a Web 2.0 platform and to gather insights

about the structure and the temporal development of an industry cluster. However, it is important to mention that Web 2.0 data is only one way to evaluate an industry cluster.

RAND-Net: A new versatile tool for network analysis and visualization

Zev Winkelman (RAND Corporation), Raffaele Vardavas (RAND), Elizabeth Bodine-Baron (RAND), Ryan Brown (RAND), David Kennedy (RAND)

RAND-Net is a project to develop a new versatile user-friendly tool that aims to greatly facilitate network analyses and visualizations needed by researchers at the RAND Corporation that work on social network data.

RAND researchers who have network analysis expertise work with currently available tools such as Gephi, SNAP.PY, R (i-graph/R-shiny) and UCINET. However, existing workflows that employ these tools at RAND require a large amount of inefficient labor. Use of the leading visualization tools often requires extensive repetition of manual procedures. The RAND-Net tool will help to reduce inefficiencies by allowing innovative analytic procedures to be fully automated and more widely available to the RAND researcher community. Moreover, researchers are increasingly working with big data and for the most part, the current tools were not built to handle scale. By employing several powerful platforms, such as Spark - GraphX, Giraffe, Georgia Tech Stinger for scalable graph manipulation, RAND-Net promises to deliver a tool that can handle dynamic, interactive network analysis and visualization on very large datasets.

Initial features of the RAND-Net tool that are in development include the ability to detect and identify a hierarchical set of social-network communities and visualize these in an informative way that avoids displaying hairball-type representations. The tool will be able to track and analyze how communities change over time by considering standard community dynamical-processes. In addition to standard network analysis features that provide vertex-specific network measures, users can specify their own measures that operate on the attributes of the vertices and edge. The tool will be designed to work in conjunction and amplify other network technological innovation in network data collection and processing that is already active at RAND, such as EgoWeb and RPG's social media ingestion engine.

Our poster aims to provide an interactive demonstration of the initial capabilities of the RAND-Net tool and to obtain feedback and suggestions by social network researchers and researchers with expertise in scalable graph manipulation.

A Two-mode Network Analysis of Top Crowdfunding Donors in Structural Equivalence

Larry Zhiming Xu (University of Southern California)

The study applies classical theories in social network analysis to the examination of crowdfunding as a novice practice. Using a donor-based approach, it analyzes a two-mode project-donor network constructed by 81 top donors out of over 100,000 on gofundme.com and demonstrates how donors are attracted by different kinds of projects from the network perspective. Based upon the theory of structural equivalence, the research investigates structurally equivalent donors and discusses to what extent the models of two structurally equivalent donors can be interchangeably used to predict each other's next move. A theoretical model derived from Bayes' theorem is proposed at last to define future research directions.

Personality and the evolution of mentor social networks in a mentoring program for at-risk youth.

Neil Yetz (Colorado State University), Kimberly Henry (Colorado State University), Shelley Haddock (Colorado State University)

Campus Connections (formerly known as Campus Corps) is a multidisciplinary service learning course at Colorado State University (CSU) where undergraduate students serve as mentors to at-risk youth. Previous research has demonstrated that personality influences the development of friendship networks within various populations. Less is known about the predictive role personality has on a mentors ability to form more and better relationships with other mentors and mentees in a program setting. Using data from the 11-week Campus Connections program, we will present findings on the effect of different personality characteristics on the evolution of mentor's social networks with other mentors and mentees over time. Using social network analyses, we will model the relationship between personality factors and the social bonds formed within the program as a predictor for mentoring success over the

11-week program. We hypothesize that certain personality factors will predict program success within the social network model.

Within-Group Communication Network Properties as Moderators in the Relationship between Leader-Member Exchange Differentiation and Follower Justice Perceptions

Jia Yu (University of Iowa)

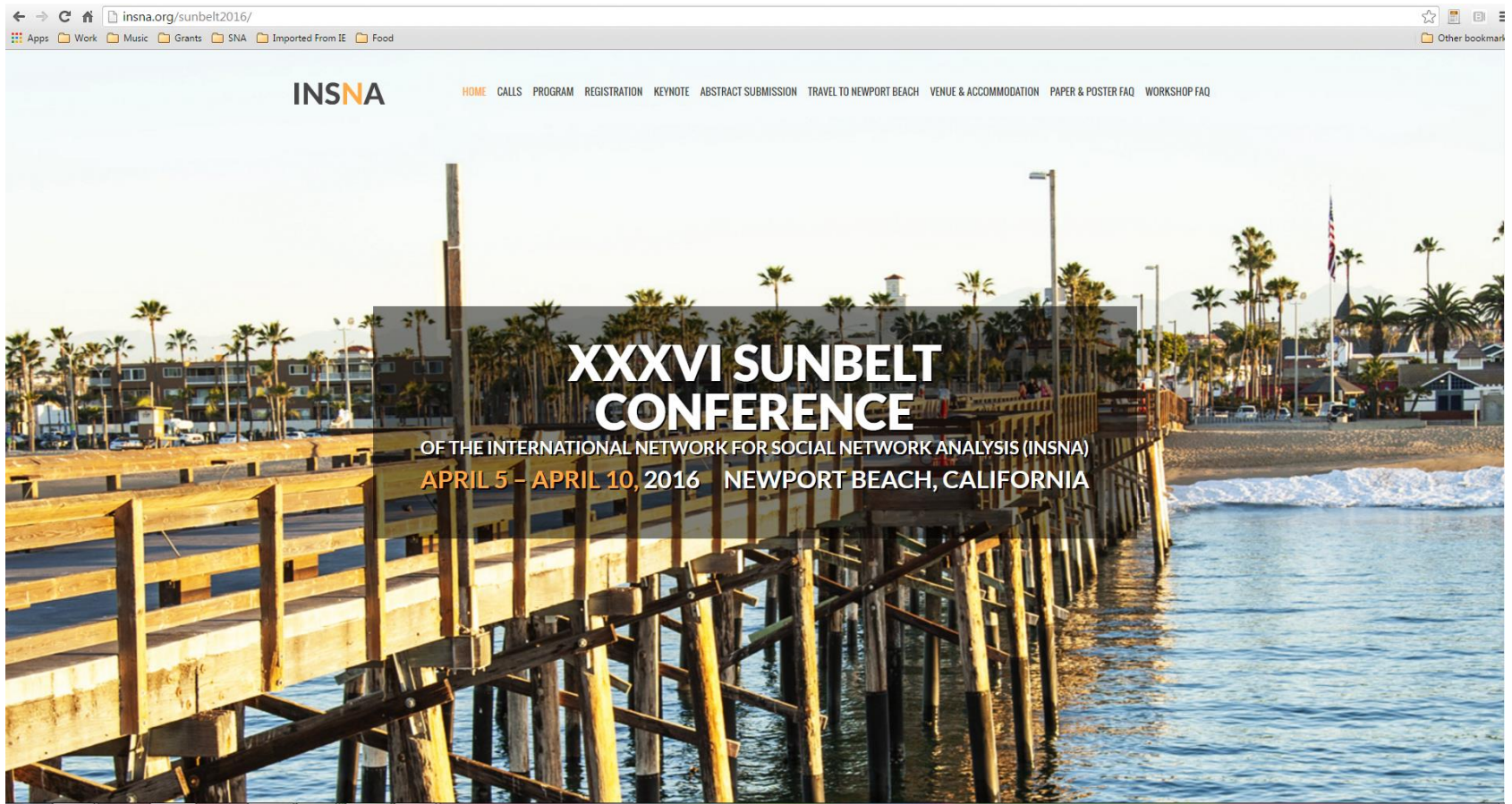
This study aims to propose and examine density and centralization of communication network as boundary conditions in the relationship between leader's differential treatments to subordinates and subordinates' justice perceptions in the workplace. The phenomenon of differential quality of relationships between leaders and followers has been termed LMX differentiation (Henderson, Liden, Glibkowski, & Chaudhry, 2009). Although there is a growing body of research aimed at exploring antecedents and outcomes of LMX differentiation (De Blanc & Gonzalez-Roma, 2012; Erdogan & Bauer, 2010), the direct influence that group-level LMX differentiation may have on justice perceptions has not been clarified (Erdogan & Bauer, 2010). We contend that within-group communication network characteristics are salient factors determining under what conditions followers will be aware of the actual LMX differentiation occurring within their groups. Specifically, we hypothesize that within-group communication network centralization and density moderates the relationship between LMX differentiation and follower perceptions of distributive, procedural, and interactional justice such that as centralization decreases and/or density increases, the relationship between LMX differentiation and justice perceptions becomes significant and negative. As centralization decreases and/or density increases, followers have more opportunity to engage in social comparisons and therefore become aware of the actual disparate treatment occurring in the group. We tested our hypotheses using survey data collected from four organizations in mainland China: a manufacturing firm of construction industry, two four-star hotels and a local government department. Surveys were administered to a total of 361 subordinates nested in 51 workgroups. This resulted in a sample size of 285 individuals nested in 38 groups. Network ratings were obtained using sociometry and each group member was asked to indicate the strength of the communication tie with other group members with the following question: "On average how often do you talk with ...?" (1=never, 2=monthly, 3=weekly, 4=once a day; 5=several times a day). Data were analyzed using hierarchical linear modeling (HLM) and organization membership as well as individual LMX quality were explored as control variables. Our findings offered some support to our hypothesis. Network centralization moderated the relationship between LMX differentiation and procedural justice perceptions such that as centralization decreased, the relationship became more significantly negative ($\gamma = 2.28$ $p < .01$). Network density also emerged as a significant moderator, indicating that as network density increased the relationship between LMX differentiation and procedural justice became more significantly negative ($\gamma = -.16$ $p < .05$). The central message of the study is that LMX differentiation may have negative implications for procedural justice perceptions as more individuals within the group are talking to each other.

Scalable Dynamic Sexual Contact Networks Analysis with DNR Structure using Retrospective Life History Data

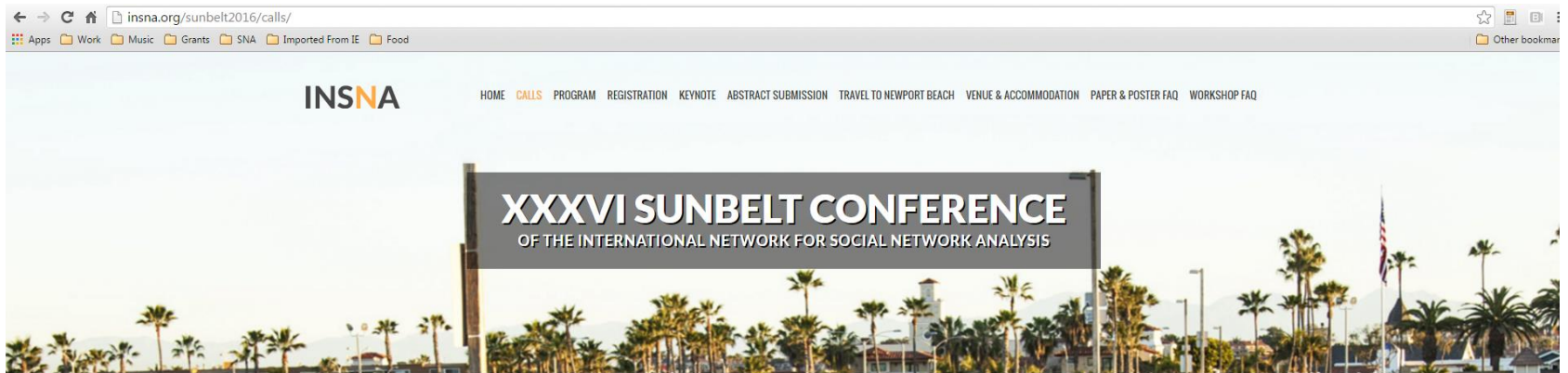
Yue Yu (UCI NCASD Lab), C Ben Gibson (UCI NCASD Lab), Carter T Butts (UCI NCASD Lab)

Currently, TERGM methods for analyzing sexual contact networks (SCNs) require simulating a network of the entire population, which is computationally intractable on a large scale. For instance, a network with population size n that simulated over time t , the complexity using the TERGM method is $O(n^2 t)$. We proposed and implemented a more scalable system to model SCNs - dynamic network regression (DNR) structure whose complexity is $O(nmt)$ where m is the sample size and is much smaller than n . In this work we investigate the system performance in different settings. We use synthetic dataset that replicate the properties of retrospective life history (RHL) collected SCN data. We examine how different types missingness introduced by differences in RHL designs affect our system performance. Then we investigate different methods to impute the missing data. We showed that with proper RHL designs and with the help of machine learning techniques, our system is able to capture the key SCN properties.

Home Page



Calls



SUNBELT 2016

CALLS

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Call for Organized Session Proposals

Opens October 5th 2015

Closes October 30th at 17:00 PST

Proposals should follow the guidelines in [this link](#).

Submit organized session proposals to: sunbelt2016@gmail.com

Call for Workshop Proposals

Opens October 12th 2015

Closes November 30th 2015 at 17:00 PST

Proposals should follow the guidelines in [this link](#).

Submit workshop proposals to: sunbelt2016@gmail.com

Call for Paper and Poster Abstracts

Program

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SUNBELT 2016

PROGRAM

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The **Conference Program** can be found at the "Full Program" link below.

Workshops are run on Tuesday April 5th and Wednesday April 6th.

Presentations begin on Wednesday April 6th and run through Sunday April 10th. To accommodate the anticipated number of papers, there are multiple paper sessions running concurrently. Sessions are divided into separate 20-minute slots for presentations.

A **Poster Symposium and Poster Slam!** with hospitality will be held Friday evening, April 8th.

There are morning and afternoon coffee breaks, extended lunch breaks, and a hospitality suite every evening, Thursday through Saturday, to provide ample opportunity for participants to meet with old friends and new colleagues.

Program Overview

DATE	AM	PM	EVENING
Tuesday April 5	Registration Workshops	Workshops	-
Wednesday April 6	Registration Workshops	Parallel Paper Sessions	-
Thursday April 7	Registration Parallel Paper Sessions	Parallel Paper Sessions	Keynote Banquet Hospitality
Friday April 8	Registration Parallel Paper Sessions	Board Meeting Parallel Paper Sessions	Poster Symposium Hospitality
Saturday April 9	Registration Parallel Paper Sessions	Board Meeting Parallel Paper Sessions	Poster Symposium Hospitality

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Keynote

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KEYNOTE & SIMMEL AWARD RECIPIENT

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Garry Robins

Melbourne School of Psychological Sciences  
University of Melbourne, Australia

Garry originally received a BSc honours degree in mathematics before a first career in the Australian foreign service. He returned to academia through completion of a B.A. and PhD in mathematical psychology from the University of Melbourne. His PhD research won awards from the Psychometric Society and the American Psychological Association. After a period at Deakin University, in 1999 he took up a position at the School of Psychology, University of Melbourne. Garry's principal work in social networks has been methodological, focusing on the development of exponential random graph models, but he has also had many collaborations in applied network-based research: for instance, epidemiology, animal behavior, defence, organizational and environmental studies. He is a past winner of the Freeman Award from INSNA and of the I2 award for the most highly cited paper in INSNA-related journals. His most recent book, *Doing Social Network Research: Network-based Research Design for Social Scientists*, appeared in 2015.

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TWITTER FEEDS

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# Travel Information

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TRAVEL TO NEWPORT BEACH

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Newport Beach is a beautiful coastal area in Southern California, boasting the largest recreational harbor on the west coast, pristine beaches and world class surf breaks, luxury shopping at Fashion Island, fine dining, outdoor recreation, and water sports.

Newport Beach is 45 miles south of Los Angeles and LAX Airport, with regular direct flights from major cities in the USA, Continental Europe, Asia, and Australasia.

The conference venue is the Newport Beach Marriott Hotel & Spa, where special conference room rates are available.



Flights

Three airports provide close access to Newport Beach:

AIRPORT	DISTANCE TO NEWPORT BEACH MARRIOTT HOTEL & SPA
John Wayne	5 miles
Long Beach	25 miles
Los Angeles (LAX)	45 miles

TRAVEL FROM LOCAL AIRPORTS TO NEWPORT BEACH

The best options for travel from local airports to Newport Beach are

 Rental Car

 Super Shuttle

 Airport Taxi or Uber

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Venue

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CONFERENCE VENUE & ACCOMMODATION



Sunbelt XXXVI will be held at the **Newport Beach Marriott Hotel & Spa** in Newport Beach, California

Conference Room Rates

The following special room rates have been offered to attendees when reserving a room in this hotel (**available until March 13, or sold out**):

- Standard guest: \$229.00 USD (plus tax)
- Student guest: \$171.00 USD (plus tax)

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FAQ

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PAPER & POSTER FAQ

FAQs for Abstract Submission, Paper Presentations, & Poster Presentations

General – Abstract Submission

What is the format of presentations at the conference?

There are two presentation formats at the conference. The first is called “20-minute lecture” and the second is called “90-minute poster seminar.”

After you submit the abstract, do you then submit the actual full paper? Is there a separate deadline for full papers? Is there a conference template for submitting full papers?

Can you tell me about the subject matter or level of technical sophistication of papers at your conference?

Are there any other requirements that I should be aware of in order to have the best chance of acceptance?

How do I know if my abstract will be assigned to a lecture or poster session?

Is there a word count or page limit for the abstract? If so, does it include the title and citations?

Is there a limit on single/multiple-authored submissions?

Is there a limit on the number of submissions per author? A colleague and I are planning two joint submissions. She will be the first author on one, and I will be the first author on the other. If both were accepted, we would both do the presentations.

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SUNBELT 2016

WELCOME TO OUR SITE

Welcome to the XXXVI Sunbelt Social Networks Conference of the International Network for Social Network Analysis ([INSNA](#)), 5-10 April 2016, in Newport Beach, California.

The International Sunbelt Social Network Conference is the official annual conference of the International Network for Social Network Analysis ([INSNA](#)). INSNA currently has over 1,000 members and more people than ever are interested in attending and presenting their work at Sunbelt conferences.

The Sunbelt conference provides an interdisciplinary venue for social scientists, mathematicians, computer scientists, ethnologists, epidemiologists, organizational theorists, public health experts, and others to present current work in the area of social networks.

Workshops, paper sessions, and a poster symposium allow individuals interested in theory, methods, or applications of social network analysis to share ideas and explore common interests.

The conference will be held at the [Newport Beach Marriott Hotel & Spa](#). Workshops begin on Tuesday April 5th and presentations begin on Wednesday April 6th.

We look forward to seeing you in sunny southern California!

The Sunbelt 2016 Conference Organizers:

Kayla de la Haye, Thomas Valente, Rebecca Davis, Hank Green, and Kate Coronges

Contact: sunbelt2016@gmail.com

Sponsors

Sunbelt XXXVI has received sponsorship from [INSNA](#), the Keck School of Medicine and Department of Preventive Medicine at the [University of Southern California](#), the [RAND](#) Corporation, [Visit Newport Beach](#), and Cambridge University Press.

For sponsorship opportunities, such as hosting Sunbelt coffee breaks or the business lunch, please contact the organizers: sunbelt2016@gmail.com





Generous Grant Support

Sunbelt XXXVI has received generous grant support from the United States Army Research Office.

