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14. ABSTRACT

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a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU	19b. TELEPHONE NUMBER 512-471-7028

RPPR Final Report

as of 17-Apr-2018

Agency Code:

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Agreement Number: W911NF-16-1-0237

INVESTIGATOR(S):

Name: Francois Baccelli
Email: Francois.Baccelli@austin.utexas.edu
Phone Number: 5124717028
Principal: Y

Name: Sriram Vishwanath
Email: sriram@ece.utexas.edu
Phone Number: 5124711190
Principal: N

Organization: **University of Texas at Austin**

Address: 101 East 27th Street, Austin, TX 787121532

Country: USA

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Final Report for Period Beginning 15-Apr-2016 and Ending 14-Apr-2017

Title: Workshop on Opinion Dynamics

Begin Performance Period: 15-Apr-2016

End Performance Period: 14-Apr-2017

Report Term: 0-Other

Submitted By: Francois Baccelli

Email: Francois.Baccelli@austin.utexas.edu

Phone: (512) 471-7028

Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees:

STEM Participants:

Major Goals: Social interactions form one of the oldest aspects of human existence, and have gained particular attention due to the rapid growth of online social networks over the past decade. Given the ever increasing degree to which the entire world social systems are intertwined, it is increasingly important to gain a deeper understanding of models that reflect these interdependencies.

Although significant work has been conducted in this direction, there is still a wide gap between existing models and the wide spectrum of current social interactions observed across different platforms. This workshop will focus on one of the key features of social systems: opinions and their dynamics. The evolution of opinions with time is of particular importance, as the latter drive institutional decision making. Social systems where opinions significantly diverge from one another can result in socio-political instability.

The aim of the workshop is to assist the Army in planning future research on Opinion Dynamics by reviewing the main methodological approaches which are currently proposed to analyze, predict and control opinion dynamics. More broadly, this workshop aims at extending the degree of cohesion of this domain of research.

The workshop featured 12 presentations of 25 minutes each, bearing on a wide variety of topics pertaining to the analysis of opinion dynamics. The abstracts of the presentations and the list of speakers are available on the conference web page <http://www.opiniondynamics.org/index.html> and are appended to the present document. Prof. D'Souza could not make it as planned, but her talk was partly covered in the lecture of Dr. K. Chan.

Accomplishments: Monday Schedule:

⌚ 8:00am-9:00am Registration + Breakfast POB Connector Lobby

⌚ 9:00am-9:30am Opening Remarks by Dr. Ahmed Tewfik and Introduction by Dr. Robert Ulman University of Texas - Austin & Department of Defense

⌚ 9:30am-10:00am Opinion dynamics and the evolution of social power in in

RPPR Final Report as of 17-Apr-2018

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☼ 10:00am-10:30am Coffee Break POB 2.402

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☼ 11:00am-12:30pm Discussion 3 & Coffee Connector Lobby

The workshop attracted 31 attendees (including the speakers) from a variety of institutions

Training Opportunities: The list of graduate and undergraduate students who attended is appended to the final report.

RPPR Final Report as of 17-Apr-2018

Results Dissemination: The workshop attracted 32 attendees (including the speakers) from a variety of institutions listed below.

1. Zack Almquist, almquist@umn.edu, University of Minnesota
2. Victor Amelkin, victor@cs.ucsb.edu, University of California, Santa Barbara
3. Francois Baccelli, baccelli@math.utexas.edu, University of Texas, Austin
4. Jonathan Bakdash, jonathan.z.bakdash.civ@mail.mil, ARL
5. Francesco Bullo, bullo@engineering.ucsb.edu, University of California, Santa Barbara
6. Kevin Chan, kevin.s.chan.civ@mail.mil, US Army Research Laboratory
7. Raissa D'Souza, raissa@cse.ucdavis.edu, University of California, Davis (absent)
8. Natasa Dragovic, ndragovic@math.utexas.edu, UT Austin
9. Jemin George, jemin.george.civ@mail.mil, ARL
10. Negar Kiyavash, kiyavash@illinois.edu, University of Illinois at Urbana-Champaign
11. Gyorgy Korniss, korniss@rpi.edu, Rensselaer Polytechnic Institute
12. Jared Leibowich, jleibowich@gmail.com, LBJ School of Public Affairs at UT Austin
13. Kristina Lerman, lerman@isi.edu, University of Southern California
14. Kyle Lewis, klewis@tmp.ucsb.edu, UCSB
15. Mayank Manjrekar, mmanjrekar@math.utexas.edu, UT Austin
16. Farzan Memarian, farzan@ices.utexas.edu, Institute for Computational Engineering and Sciences
17. Edward Palazzolo, edward.t.palazzolo.civ@mail.mil, Army Research Office
18. Christoph Riedl, c.riedl@neu.edu, Northeastern University
19. Juan Diego Rodriguez, jrodriguez@ices.utexas.edu, ICES, UT Austin
20. Abishek Sankararaman, abishek@utexas.edu, UT Austin
21. Anna Scaglione, ascaglio@asu.edu, Arizona State University
22. Sanjay Shakkottai, shakkott@austin.utexas.edu, UT Austin
23. Ambuj Singh, ambuj@cs.ucsb.edu, University of California, Santa Barbara
24. Andrew Slaughter, andrew.slaughter@gmail.com, US Army Research Institute
25. Ananthram Swami, ananthram.swami.civ@mail.mil, ARL
26. Ahmed Tewfik, tewfik@austin.utexas.edu, UT Austin
27. Robert Ulman, robert.j.ulman.civ@mail.mil, Army Research Office
28. Sriram Vishwanath, sriramuniverse@gmail.com, UT Austin
29. Hoi-To Wai, htwai@asu.edu, Arizona State University
30. Jae Oh Woo, jaeoh.woo@utexas.edu, The University of Texas at Austin
31. Xiaoxiao Wu, xxwu.eesissi@gmail.com, Arizona State university
32. Qing Zhao, qz16@cornell.edu, Cornell University

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI

Participant: Francois Baccelli

Person Months Worked: 1.00

Project Contribution:

International Collaboration:

International Travel:

National Academy Member: N

Other Collaborators:

Funding Support:

Participant Type: Co PD/PI

Participant: Sriram Vishwanath

Person Months Worked: 1.00

Funding Support:

RPPR Final Report
as of 17-Apr-2018

Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

ACTIVITY REPORT
Opinion Dynamic Conference, June 13-14, 2016
François Baccelli and Sriram Vishwanath
Sponsored by ARO
The University of Texas at Austin

1 Foreword

Social interactions form one of the oldest aspects of human existence, and have gained particular attention due to the rapid growth of online social networks over the past decade. Given the ever increasing degree to which the entire world social systems are intertwined, it is increasingly important to gain a deeper understanding of models that reflect these interdependencies.

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2 Workshop Presentations

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The workshop attracted 31 attendees (including the speakers) from a variety of institutions listed below.

3 Workshop Discussion Sessions

3.1 Background

Three discussion sessions following the "World Café" format were organized. Questions were collected before the meeting and discussed in randomly organized tables of about 7-8 persons.

3.2 Questions and Answers

3.2.1 Discussion 1

1. What are appropriate models of opinion dynamics and influence networks in the context of large groups?

- In the case of linear dynamics, a large network would need a large interaction matrix. Simple schemes like assigning i.i.d. weights to this large interaction matrix will then probably no longer be accurate representations of large networks. Flat Mean-field type models might then not be appropriate to analyze large interacting networks.
- Models of large networks should probably include many small sub-structured connected components to form a larger network. Such models may be a better representation of large social networks.
- Context dependent models are clearly needed and are preferable to having a single large model for all social networks.
- Another way of looking at the problem is in term of model scalability. For example small networks are designed/analyzed based on the fact that the members of the society want to collectively achieve a goal. Thus, consensus models for such networks make sense. However, once the network becomes very large, the goals of the agents and the network can be a bit different. In particular, consensus models may not be the best to describe such a heterogeneous network with different agents most likely having different goals.
- Opinion dynamics must probably be considered on hyper-graphs or other structures and not just on graphs in the case of large networks.
- Fluid models could perhaps be useful and accurate in the regime of large number of agents.
- Structured mean-field models may be useful in this context. There may be technical issues of time-scale of network operation being function of the size of the network thereby requiring some care in proposing and analyzing through mean-field models.

2. Linear and non linear models of opinion dynamics can lead to quite different physical phenomena. Which one is right/wrong?

- Non-linear is indeed the way to go since plain linear models always predict consensus. Also there is evidence from sociology that geographically co-located people interact more and exchange opinions faster. Hence, the non-linear models that stipulate people with closer opinions interact more frequently can have some basis to it.
- Linearization around the fixed point of non-linear models can be a step to handle the intractability of non-linear models.
- There is very little data to test whether one model is more representative than the other in a given context. So simple linear models might be a good starting point to explain observations in data or controlled experiments. If linear models lack representing important phenomena, then think of non-linear models.
- Some argued that there was validity in studying linear models, since more realistic models such as the Heggselman-Krausse dynamics can be decomposed into linear interactions phases.

3. How to model the content of a message and the user behavior to get a more accurate model of persuasion?

- The latent variable model was suggested. Have a small set of underlying words that signify certain emotions or certain opinion changes. Then the actual message is expressed in words that are drawn as a mixture or through a noisy process from this pure set of opinions. The receiver of the message also reacts in a stochastic fashion based on his/her estimate of the underlying pure opinion or emotion expressed.
- Persuasion can be modeled through stubborn agents.

4. **Are there directions in which research on the analysis or the control of opinion dynamics could be unethical?**

- Like any technology, the theory of influence maximization, put in malicious hands, will of course be potentially dangerous. Hence there is a need to have a mathematical understanding of influence maximization. Particularly so in networks where power is centralized.
- Like in Biology, it might be appropriate to have an ethics professional on the research team and keep them in the loop.
- Facebook manipulating people's time-line for a scientific study changed the emotions of people. The question is whether this is ethical. Probably not if not consented.
- There is a question of privacy of publicly available data sets in studying opinion dynamics. For instance outliers can be identified.
- Manipulation has always existed in social networks. Even the act of conversing and exchanging opinions can be viewed as wielding influence. Is that a breach of ethics then ?

3.2.2 Discussion 2

1. **Several models for opinion dynamics are pursued by the CS, math and physics communities. Their respective scope and purview is unclear and their supporting empirical evidence is scant. What is the missing evidence to bring clarity in this cacophony?**

- There is a clear need to improve the validation of models by confronting them to data. The list of the key variables that go into a model is also essential to make a classification. Also, models need to be proposed that are robust to noisy inputs.
- There is also a need for a definition of the space of opinions. It seems essential to have a social scientist on the team.
- A key questions is how to design experiments to confront them to data.
- There is an issue of missing information on human cognition data. The ways we receive information and we learn from it are sometimes different. Thus, there is a need to understand and quantify this variability.
- It was recommended to look at long-term public data sets on opinions. For example op-eds in NY-Times or the Washington Post. One can then build a topic model to predict the movement of opinions and test these models. Some other example of data-sets are Reddit and Quora, Enron Email data set on how opinions spread and people got influenced and the LGBTQ data set. These are examples of longitudinal data sets in which opinions evolve over time which can possibly be used for building and validating opinion dynamics models.

2. **How would one extend opinion dynamics from a single network to multiple networks?**

- Multilayer multiplexed networks were discussed. Opinions spread in one network, and this affects the opinions in another.
- Different networks having different time scales. There is need of mathematical tool to analyze such multi-scale correlated dynamics.
- There can also be questions of observability. May be we can observe opinions only in a few networks. How does one model and take into account the evolution of the underlying latent variables that are un-observed?
- The “Halo Effect” was discussed. The reputation or trust about a person in one network will be carried over to the other.
- Examples of interlayer interaction networks were discussed: political networks where there is a private opinion and a public opinion both interacting and influencing each other.
- Some examples of data sets - Online socio-technical systems. For instance in Github, there is data on authoring, coding and commenting. There is data in online purchase systems on buying and reviewing.
- To what degree can conclusions about one network be transferred to another one? Opinion Dynamic equivalence of different networks.
- Co-evolution and co-existence of networks was discussed. Observing opinion in one, then what can be said about the evolution in the other network? The fact that opinion leaks across networks was discussed.

3.2.3 Discussion 3

1. What are the grand challenges in opinion dynamics?

- Challenge 1 is the design of a benchmark and of a systematic way of measuring and validating opinion dynamics models. The research community needs benchmark data sets and metrics to evaluate models. Probably, one can have more accurate models by restricting the view to a certain group.
- Challenge 2 is about understanding and comparing the power of expression of various models.
- Challenge 3 is about Co-evolution of networks and opinions. What does a network mean when the system itself is evolving. There is a need for models representing both dynamics on and off networks.
- When looking at large system, one may only have limited observation - for example missing nodes and missing time stamps. There may be issues of hidden opinion in networks. In many cases people may be hesitant to express their true opinions due to cultural barriers. Challenge 4 is the design of robust models that can incorporate such missing or hidden data.
- Data that is anonymous can often be identified. This is a serious issue. Challenge 5 is to define levels of anonymity and only present/publish truly anonymized results.

2. Are Opinion Dynamics models robust to cultural differences?

- Certain parametric models can incorporate different cultural view points. Ex. Collective versus individualistic society.
- When moving from one culture to another, the parameters and the observable may change, but the underlying form of the dynamics may be invariant. Different cultures may lead to different parameters but not necessarily different models.

- Some example of different cultural view point: in some societies, extremal opinions may be stubborn and in others, a neutral opinion may be stubborn.
- A research challenge proposed is to look at existing models and then try and incorporate some aspects of culture into them.
- Another question raised was how to model multiple cultures interacting in the same network k a single dynamics

3. How would you study opinions dynamics if twitter went away?

- Once could still perform a social polling. How does the presence of online social media impact opinion dynamics ? Probably through a faster effect of cascade.
- The loss of Twitter would not so bad. There are newspapers, predict-it logs and Facebook. We are in a generation where if one source of online media goes away, then something else will take its spot. The society will not be without social media for long.
- People selling data-sets for researchers. There is scope to have separate opinion data and network data. For instance Wikipedia, Amazon and Netflix all seem like potential data for opinion dynamics.

4 Acknowledgements

The organizers thank ARO for having accepted to support this workshop. The support of the department of ECE was also greatly appreciated. The administrative support of T. Claiborne was essential to success of the event. The organizers also thank Abishek Sankararaman for his help in collecting the answers in the discussion sessions.

5 Appendix: List of Attendees

1. Zack Almquist, almquist@umn.edu, University of Minnesota
2. Victor Amelkin, victor@cs.ucsb.edu, University of California, Santa Barbara
3. Francois Baccelli, baccelli@math.utexas.edu, University of Texas, Austin
4. Jonathan Bakdash, jonathan.z.bakdash.civ@mail.mil, ARL
5. Francesco Bullo, bullo@engineering.ucsb.edu, University of California, Santa Barbara
6. Kevin Chan, kevin.s.chan.civ@mail.mil, US Army Research Laboratory
7. Raissa D'Souza, raissa@cse.ucdavis.edu, University of California, Davis (absent)
8. Natasa Dragovic, ndragovic@math.utexas.edu, UT Austin
9. Jemin George, jemin.george.civ@mail.mil, ARL
10. Negar Kiyavash, kiyavash@illinois.edu, University of Illinois at Urbana-Champaign
11. Gyorgy Korniss, korniss@rpi.edu, Rensselaer Polytechnic Institute
12. Jared Leibowich, jleibowich@gmail.com, LBJ School of Public Affairs at UT Austin
13. Kristina Lerman, lerman@isi.edu, University of Southern California

14. Kyle Lewis, klewis@tmp.ucsb.edu, UCSB
15. Mayank Manjrekar, mmanjrekar@math.utexas.edu, UT Austin
16. Farzan Memarian, farzan@ices.utexas.edu, Institute for Computational Engineering and Sciences
17. Edward Palazzolo, edward.t.palazzolo.civ@mail.mil, Army Research Office
18. Christoph Riedl, c.riedl@neu.edu, Northeastern University
19. Juan Diego Rodriguez, jrodriguez@ices.utexas.edu, ICES, UT Austin
20. Abishek Sankararaman, abishek@utexas.edu, UT Austin
21. Anna Scaglione, ascaglio@asu.edu, Arizona State University
22. Sanjay Shakkottai, shakkott@austin.utexas.edu, UT Austin
23. Ambuj Singh, ambuj@cs.ucsb.edu, University of California, Santa Barbara
24. Andrew Slaughter, andrew.slaughter@gmail.com, US Army Research Institute
25. Ananthram Swami, ananthram.swami.civ@mail.mil, ARL
26. Ahmed Tewfik, tewfik@austin.utexas.edu, UT Austin
27. Robert Ulman, robert.j.ulman.civ@mail.mil, Army Research Office
28. Sriram Vishwanath, sriramuniverse@gmail.com, UT Austin
29. Hoi-To Wai, htwai@asu.edu, Arizona State University
30. Jae Oh Woo, jaeoh.woo@utexas.edu, The University of Texas at Austin
31. Xiaoxiao Wu, xxwu.eesissi@gmail.com, Arizona State university
32. Qing Zhao, qz16@cornell.edu, Cornell University

Opinion Dynamics

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Register (<http://goo.gl/forms/IJnNEMAi7V>)

Contact

Conference on

Opinion Dynamics

13-14 June, 2016

Location

201 E 24th St. Austin, TX
POB 2.402

Speakers

12 Professional Speakers
Schedule below

00

Days

00

Hours

00

Minutes

00

Seconds

Overview

About the Conference

Social interactions form one of the oldest aspects of human existence, and have gained particular attention due to the rapid growth of online social networks over the past decade. Given the ever-increasing degree to which the entire world social systems are intertwined, it is increasingly important to gain a deeper understanding of models that reflect these interdependencies.

The impact of opinion dynamics on socioeconomics and politics on a society is well noted in social and political sciences literature. For this reason understanding of opinion dynamics has driven a significant amount of research in social sciences, physics, computer science, and electrical engineering. Different objectives of the researchers from these various fields resulted into multidirectional studies of opinion dynamics.

The aim of the workshop is to review the main methodological approaches which are currently proposed to analyze, predict and control opinion dynamics. More broadly, this workshop aims at extending the degree of cohesion of this domain of research.

[SEE EVENT SCHEDULE](#)[REGISTER NOW \(HTTP://GOO.GL/FORMS/IJNNEMAI7V\)](http://goo.gl/forms/IJNNEMAI7V)



Event Schedule

Monday June 13th

TIME	EVENT	DESCRIPTION
8:00am-9:00am	Registration + Breakfast	POB Connector Lobby
9:00am-9:30am	Opening Remarks by Dr. Ahmed Tewfik and Introduction by Dr. Robert Ulman	University of Texas - Austin & Department of Defense
9:30am-10:00am	Opinion dynamics and the evolution of social power in influence networks. Francesco Bullo, uc - Santa Barbara.	I will discuss a novel model for the evolution of self appraisal, social power and interpersonal influences for a group of individuals who discuss and form opinions about a sequence of issues. Our model combines the averaging rule by DeGroot to describe opinion formation processes and the reflected appraisal mechanism by Friedkin to describe the dynamics of individuals' self appraisal and social power. We provide a rigorous mathematical formulation of the influence network dynamics, characterize its equilibria and establish its convergence properties for all possible structures of the relative interpersonal weights and corresponding eigenvector centrality scores.
10:00am-10:30am	Coffee Break	POB 2.402
10:30am-11:00am	Social Network Processes in Collaborative Decision-Making. Christoph Riedl, Northeastern University.	Solving global problems with only local information is fundamental problem that depends critically on networked forms of collaboration. Beyond tradeoffs in exploration and exploitation, problem-solving performance depends on actors' ability to effectively find solutions to complex problems. Prior research has address the question whether lone inventors or teams are more successful in

finding breakthrough solutions. The classic view takes the role of teams and those of innovators separately highlighting a central but unresolved question: What is the effect of innovators on a collective's ability to solve global problems, which rely critically on sharing of ideas? In this paper we investigate the effect of introducing innovators into a population of incrementalists on emergent system-level performance. We systematically investigate the structure of communication networks among actors, which affects actors' ability to maintain diversity in the system using agent-based modeling. We explore the mechanisms responsible for changes in performance including information diversity and average path lengths in communication networks. We find that innovators increase performance (in all types of networks) through their ability to reach solutions that are not reachable by incrementalists. Furthermore, innovators can help overcome the inability of efficient networks to retain information diversity and thus achieve higher performance. Increasing heterogeneity with regard to their degree of innovativeness increases information diversity and thus performance. We discuss additional results with regard to the number of innovators, innovators' degree of risk-taking, and their position within a network.

11:00am-
11:30am

**Voter models,
opinion dynamics,
and social influence**

Raissa D'Souza, UC -
Davis.

What drives social change? And how can we capture the mechanisms with simple mathematical models? Here we will review several existing models, including the voter model and the naming game, and discuss new phenomena such as catastrophe hopping and how to disentangle the impact of influential versus susceptible agents..

11:30am-
1:30pm

**Discussion 1 and
Lunch**

POB Connector Lobby

1:30pm-
2:00pm

**The Impact of
Heterogeneous
Thresholds on
Social Contagion
with Multiple
Initiators**

Gyorgy Korniss,
Rensselaer Polytechnic
Institute

The threshold model is a simple but classic model of contagion spreading in complex social systems. To capture the complex nature of social influencing we investigate numerically and analytically the transition in the behavior of threshold-limited cascades in the presence of multiple initiators as the distribution of thresholds is varied between the two extreme cases of identical thresholds and a uniform distribution. We accomplish this by employing a truncated normal distribution of the nodes' thresholds and observe a non-monotonic change in the cascade size as we vary the standard deviation. Further, for a sufficiently large spread in the threshold distribution, the tipping-point behavior of the social influencing process disappears and is replaced by a smooth crossover governed by the size of initiator set. We demonstrate that for a given size of the initiator set, there is a specific variance of the threshold distribution for which an opinion spreads optimally. Furthermore, in the case of synthetic graphs we show that the fraction of active nodes asymptotically becomes independent of the system size, and that global cascades can arise just by the addition of a single node to the initiator set.

2:00pm-
2:30pm

**Information
diffusion over
textually derived
collaboration
networks of radical
environmental
organizations**

Zack Almquist, University
of Minnesota.

Radical environmental groups have a varied agenda which encompasses both local and global issues. In their efforts to call attention to environmental problems these organizations produce an enormous amount of text, which can be used to estimate the complex communication networks that underlie the interaction patterns between these organizations. Further, we can employ these networks to understand how information flows between organizations to study collaborative action and outcomes such as non-violent protests or violent action such as fire bombings and property defacement.

2:30pm- 3:00pm	Coffee Break	POB 2.402
3:00pm- 3:30pm	Polarization in opinion diffusion and active sensing of social network systems Anna Scaglione, Arizona State University	In this talk we will first briefly review the salient properties of the key mathematical models capture polarization phenomena in social agents interactions: the so called DeGroot model of consensus building in the presence of stubborn agents and Hegselmann-Krause/Deffuant model model of bounded confidence. We will then introduce the "social radar" problem of identifying the trust system that characterizes the dynamics of the opinions in a network with stubborn agents and present our findings and results on synthetic and real data.
3:30pm- 4:00pm	Stochastic Bounded Confidence Opinion Dynamics with Pairwise Interactions and Self Beliefs Francois Baccelli, UT - Austin.	In linear opinion dynamics, an agent updates its opinion based on the opinions of its neighbors in a static social graph irrespective of the current values of their opinions. In contrast, in the bounded confidence opinion dynamics, an agent only incorporates the opinion of another agent if their current opinion difference is less than a fixed threshold. We generalize the bounded confidence opinion dynamics by incorporating pairwise stochastic interactions based on opinion differences as well as the self or endogenous evolution of the agent opinions, which is represented by an additive noise. We analytically characterize the conditions under which this stochastic dynamics is stable on the real line. This characterization relates well to what is observed in societies. Moreover, this generalization sheds light on combining linear graph based and bounded confidence dynamics.
4:00pm- 4:30pm	Zealotry and Cyclic	Zealotry has been shown to prolong coexistence times and promote stability in

Dominance
Kevin Chan, US Army
 Research Laboratory.

3-species cyclic dominance games such as rock-paper-scissors (RPS). We consider the impact of zealotry on the five-species cyclic dominance game, rock-paper-scissors-lizard-Spock (RPSLS). In these games, each species dominates two other species and gets dominated by the other two species. We assume that the interactions result in a dominated species getting converted to the dominating species. We explore how zealotry promotes coexistence in RPSLS through the presence of additional steady state solutions.

4:30pm-6:00pm

Discussion 2 & Coffee

Connector Lobby

7:00pm-8:30pm

Dinner

The Clay Pit

Tuesday June 14th

TIME	EVENT	DESCRIPTION
8:00am-8:30am	Breakfast	POB Connector Lobby
8:30am-9:00am	Inferring and Influencing Social Opinion Qing Zhao, Cornell University.	We consider two problems: how to poll a social network so that the opinion of every agent can be inferred from a minimum number of samples; how to influence the opinion dynamics of a social network to arrive at the most desirable opinion profile by a deadline and under a budget. The first problem is formulated as a minimum information dominating set problem in graphs, and we establish the complexity of the problem and develop approximation algorithms. The second problem leads to an optimal control problem in continuous-time dynamic systems. We establish that the

optimal strategy is to exert maximum effort in waves and then cease effort and let the effects propagate.

9:00am-
9:30am

Modeling and Measuring Opinion Dynamics

**Ambuj Singh, UC - Santa
Barbara.**

Analysis of opinion dynamics in social networks plays an important role. For applications such as predicting users' political preference, it is particularly important to be able to analyze the dynamics of competing opinions: while observing the evolution of polar opinions of a social network's users over time, can we tell when the network "behaved" abnormally? Furthermore, can we predict how the opinions of the users will change in the future? To answer such questions, it is not sufficient to study individual user behavior, since opinions can spread far beyond users' ego-networks. Instead, we need to consider the opinion dynamics of all network users simultaneously and capture the effect of individuals' behavior on the global evolution pattern of the social network. We introduce the Social Network Distance (SND)—a distance measure that quantifies the "cost" of evolution of one snapshot of a social network into another snapshot under various models of polar opinion propagation. SND has a rich semantics of a transportation problem, yet, is computable in time linear in the number of users and, as such, is applicable to large-scale online social networks. In our experiments with synthetic and Twitter data, we demonstrate the utility of our distance measure for anomalous event detection.

9:30am-
10:00am

Coffee Break

POB 2.402

10:00am-
10:30am

Learning influences in networks: an information-

We discuss a recently proposed graphical model for representing influence networks of stochastic processes, the directed

**theoretic
perspective**

Negar Kiyavash,
University of Illinois at Urbana-
Champaign.

information graphs. We demonstrate how directed information quantifies Granger causality in a particular sequential prediction setting. We also present efficient methods to estimate the topological structure from observed time series data. We demonstrate the effectiveness of the proposed algorithms and methodology through analysis of both synthetic data and real data from the Twitter network. In the latter case, we identify which news sources influence users in the network by merely analyzing tweet times.

10:30am-
11:00am

**The “Majority
Illusion” and Other
Paradoxes of Social
Perception**
Kristina Lerman,
University of Southern
California.

Individuals often estimate the opinions and behaviors of others from the local observations of their friends. Social networks, however, have counter-intuitive properties, which may significantly distort the observations people make of their friends. One of these properties is the “friendship paradox” that states that, on average, your friends have more friends than you do. Recently, a variety of other, stronger, paradoxes were demonstrated in social networks, including that most of your friends have more friends than you do. As a result of these paradoxes, an opinion that is globally rare in a network may be dramatically over-represented in the local neighborhoods of many individuals. This effect, which I call the “majority illusion”, leads individuals to systematically overestimate the prevalence of that opinion, and it may accelerate the spread of social contagions and adoption of social norms.

11:00am-
12:30pm

Discussion 3 & Coffee

Connector Lobby

Our Speakers

Zack Almquist ()

University of Minnesota

Almquist is an Assistant Professor of Sociology and Statistics at the University of Minnesota. His interests include network analysis, big data, and human judgment and decision making.

Francois Baccelli ()

University of Texas

Francois Baccelli is Simons Math+X Chair in Mathematics and ECE at UT. His research directions are at the interface between Applied Mathematics and Communications.
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Francesco Bullo ()

University of California, Santa Barbara

Francesco Bullo is a Professor with the Mechanical Engineering Department and the Center for Control, Dynamical Systems and Computation at the UC.
[read more »](#)

Kevin Chan ()

US Army Research Laboratory

Kevin Chan has been at the US Army Research Laboratory since 2008 and has been an active researcher in trust, quality of information, opinion dynamics and dynamic networks.

Raissa D'Souza ()

University of California, Davis

Raissa D'Souza is Professor of Computer Science and of Mechanical Engineering at the University of California, Davis, as well as an External Professor at the Santa Fe Institute.
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Negar Kiyavash ()

University of Illinois at Urbana-Champaign

Negar Kiyavash is Willett Faculty Scholar and an Associate of Center for Advance Study at the University of Illinois at Urbana-Champaign.
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Gyorgy Korniss ()

Rensselaer Polytechnic Institute

Prof. Gyorgy Korniss received his MS in Physics at Eotvos University, Budapest in 1993 and his Ph.D. in Physics at Virginia Tech in 1997.
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Kristina Lerman ()

University of Southern California

Kristina Lerman is a Project Team Lead at the University of Southern California Information Sciences Institute and holds a joint appointment as a Research Associate Professor in the USC Computer Science Department. Trained as a physicist, she now applies network and machine learning-based methods to problems in social computing and social media analysis.

Christoph Riedl ()

Northeastern University

Anna Scaglione ()

Arizona State University

Christoph Riedl is assistant professor for Information Systems at the D'Amore-McKim School of Business at Northeastern University.
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Anna Scaglione (M.Sc.'95, Ph.D. '99) is currently a professor in electrical and computer and energy engineering at ASU since 2015.
[read more »](#)

Ambuj Singh ()

University of California, Santa Barbara

Ambuj K. Singh is a Professor of Computer Science at the University of California, Santa Barbara. He has led a number of multidisciplinary projects including IGERT program on Network Science, and a MURI on Network Science of Teams.

Qing Zhao ()

Cornell University

Qing Zhao joined the School of Electrical and Computer Engineering at Cornell University in 2015 as a Professor. Prior to that, she was a Professor at University of California, Davis.
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