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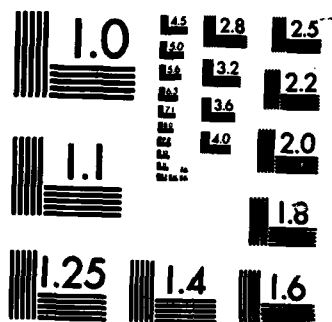
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → A conference was organized that brought together 110 research scientists of diverse specialities to address a comprehensive review of the relationship of cybernetics to relevant disciplines, including biochemistry, physiology, chemistry & information sciences, and to relevant conceptual areas, including interactive training, organizational autonomy, and policy methodology. Additional keywords: expert systems, decision making. ←		

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FUNDAMENTALS OF CYBERNETICS

Cybernetics has been defined in many ways since the word was coined in 1950 as meaning "communication and control in the machine and animal (man)" by Norbert Wiener, a famous mathematician.

When combined with some of the less well known ideas from General Systems Theory (i.e. the General Theory of Systems) by Von Bertalanffy, a famous biologist, at about the same time and with the work of a few others afterwards, more descriptive definitions would now include:

- The science of the relationship between people, machines and organizations.
- The expert generalist's approach to his life and the world.
- The bridge between philosophy and science.
- A new program for rigorously handling problems outside the scope of scientific methodology.
- Codifying the "experience" that good high level managers say they have gained through the years in trying to get organizations and people to function well together.

Nevertheless, Cybernetics being what it is, the applications are certainly there. That is, the road ahead for this fledgling science with its heavy claim as a brand new way to look at the complexities of the world and the people interrelating in it, is bound to be strewn with many new insights amongst the twists and turns.

In view of the above and in the interest of succinctness, I will attempt to list observations to you from the various sessions that are interpreted for applications without elaboration or defending logic. Obviously, this is my own perception and interpretation and there would be many others from others at the conference. This in itself is Cybernetic; but at this level of generality. I believe my comments could be useful to you on a day-to-day basis because of the common characteristics of our backgrounds. Anyone wanting to pursue these points further should contact me and I will attempt to explain further and give references.

1. Session 1 was supposed to cover fundamentals but was really more oriented to the latest theoretical thinking and distinctions. Particularly, it focused on second order Cybernetics (i.e., the nature of the observer) and delved into things like the Characteristics of the relationships and operations between self, paradigm, and one's activities. Information/understanding, self organization, regulation (in a broader sense), requisite variety, etc. were also covered.

Application: It is generally accepted and demonstrated in Cybernetics that not only do viewpoints and deep value systems vary, but that the "facts" are shaped (even created) to fit one's particular paradigm. Thus, the Cybernetician does not say, "This person is not acting rationally based on the facts." Rather, he attempts to find out the value system/paradigm that this person is operating with in order to understand what the person sees as "facts" and his appropriate resulting action. Only after he thinks he understands this does the Cybernetician make judgments and try to build understandings between his and other person's paradigm and actions.

2. Session 2 was more second order Cybernetics and got into things like autonomy, objectivity/subjectivity, and the operations of the self in various contexts and distinctions.

Application: People operate on the basis of the coherence of their distinctions and this is represented by their memory (and I believe their conditioning), not some physical manifestations.

3. Session 3 related some of these second order concepts to language and understanding and got into things like the common contexts of language around which meaning occurs.

Application: Understanding with another is never having exactly the same pattern and basis. It is a best fit of some type. As a corollary, knowing the language involved is not necessarily helpful to this best fit, but it may help in the process of trying to understanding.

4. Session 4 was the first one which demonstrated how Cybernetics had actually been used in computerized learning systems for disadvantaged children and with family therapy work by psychologists. (Although some got into a chicken/egg argument about the relationship between the topics and Cybernetics. i.e., Were they really putting a Cybernetic label on things that had developed by other means?)

Applications: The patterns that connect are the essence of learning.

5. Session 5 got into artificial intelligence and the Cybernetics of the approaches being used. Examples in robotics and used of conversation theory for decisioning in complex situations was described. (The latter approach will be one of the key tools used in the R&D project on cognitive processes, recently launched as an adjunct to the Detailed Control Room Design Review for NMP-1.)

Application: When zeroing in on some specific objective or "bullseye" the aim is not some linear progression of formulation but a matter of identifying the appropriate constraints to stay within while progressing.

6. Session 6 was a discussion of the characteristics of information relative to knowledge, and, together, their impact on economics (as seen by a man who described and practices economic modeling).

Application: Managers of economics (and organizations in general) are locked into or constrained by the information sources and the characteristics that they have. In fact, economics (and organizations) can be more fundamentally described and characterized by their information flows (i.e., How they handle it and not just its content).

7. Session 7 was the most applicable, relative to the operation of organizations, but was also the most controversial in focusing on the issue of the theoretical approach to organizational modeling vs. the experimental or data-based approach.

One of the speakers, Chris Argyris from Harvard, had collected data and information from organizations all over the world and built from it a model that was based on the gaps and misconceptions that exist or are created between people's values, actions and consequences in dealing with each other in organizational contexts. He shows that the results of this discourage risk taking, leaves some important subjects in an "undiscussable" status, creates double binds, leads to self-fulfilling prophecies, etc.

Ian Mitroff from USC described a process of group consensus decision making that had been developed through much consulting experience for circumstances where the subjects or questions involved are very judgmental and complex. Basically, it involved identification of appropriate stakeholders and rating or graphing their detailed concerns or strategy evaluations under various scenarios. It would be most useful in policy making or determining major shifts in organizational direction.

Application: Potential applications out of those would be specific use of their approaches to particular cases. I will attempt to obtain publications of the details of their approaches, if anyone wants it. Some key aspects of the latter subject were developed in detail in a class on Cybernetic Methodology that I took while at San Jose State University, and some of these will be used in the HEO/HED assessment program for the NMP-1 DCRDR.

8. Although no publications were handed out at the conference, a reference should be made to one relevant paper: Robb, F. F. (1984) Cybernetics in management thinking. Systems Research, 1 (1), 5-23. It has some excellent discussions which help to fill in the many gaps between the theories and applications. It elaborates in some of the areas discussed at the conference and covers others that I believe Cyberneticians in general would say are important to the operation of organizations.

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GORDON RESEARCH CONFERENCE ON CYBERNETICS

Conference Chairman: Leo Steg, The Brookings Institution
Vice-Chairman: Heinz Von Foerster, University of Illinois (ret.)

Session 1. August 27

Topic: Fundamentals--circularity, process, variety, observation

Chairman: Larry Richards, Colby college, Maine

Principal Speakers:

1. Heinz Von Foerster, University of Illinois (ret.)
2. Humberto Maturana, University of Chile
3. Stuart Umpleby, George Washington University

Session 2. August 27

Topic: Organization, Autonomy, and Autology

Chairman: Milan Zeleny, Fordham University

Principal Speakers:

1. Francisco Varela, University of Chile
2. Peter Hejl, University of Siegen, W.Germany
3. Lars Lofgren, University of Lund, Sweden

Session 3. August 28

Topic: Language, Understanding, and Hermeneutics

Chairman: Ernst von Glasersfeld, University of Georgia

Principal Speakers:

1. Alton Becker, University of Michigan
2. Mark Bickhard, University of Texas

Session 4. August 28

Topic: Transaction and Interaction in Small Systems

Chairman: Fred Steier, Philadelphia Child Guidance Clinic

Principal Speakers:

1. Doreen Steg, Drexel University
2. Carlos Sluzki, San Francisco General Hospital
3. Paul Watzlawick, Mental Research Institute

Session 5. August 29

Topic: The Logic and Language of Expert Systems

Chairman: Paul Pangaro, Pangaro Associates

Principal Speakers:

1. Michael Arbib, University of Massachusetts
2. Gordon Pask, Concordia University, Montreal

Session 6. August 29

Topic: The Role of Information in Economic Activity

Chairman: Klaus Krippendorff, University of Pennsylvania

Principal Speakers:

1. Donald Lamberton, University of Queensland
2. Charles Jonscher, MIT

Session 7. August 30

Topic: Methodology in Decision-making and Policy Formulation

Chairman: John Steinbrunner, Brookings Institution

Principal Speakers:

1. Chris Argyris, Harvard University
2. Ian Mitroff, University of Southern California

Session 8. August 30

Topic: Adaptation in Complex Genetic and Neural Systems

Chairman: Stuart Kauffman, University of Pennsylvania

Principal Speakers:

1. Eugene Yates, UCLA Crump Institute for Medical Research
2. Stephen Grossberg, Boston University

Session 9. August 31

Topic: Cybernetics and Chemistry

Chairman: Rudolph J. Marcus, Office of Naval Research

Principal Speakers:

1. Sam Perone, Lawrence Livermore Laboratory
2. Ray Carhart, Lederle Laboratories

Attendees
GORDON RESEARCH CONFERENCE
ON
FUNDAMENTALS OF CYBERNETICS
AT
THE NEW HAMPTON SCHOOL
AUG. 27 - 31, 1984

Marianne Amarel DR003
National Institute of Education
1200 19th Street, N.W.
Washington, D. C. 20008

Saul Amarel DR003
Rutgers University
New Brunswick, New Jersey 08903

Alexander Andrew BE304
Viable Systems
Splatt Mill
Chillaton, Lifton, DeVon, England PL1603B

Alton Becker LE108
University of Michigan
1091 Frieze/Linguistics
Ann Arbor, Michigan 48109

Naaman Belkind MO208
Israeli Embassy
3514 International Drive N.W.
Washington, D. C. 20008

Kirstie Bellman DO103
Crump Inst. for Med. Engineering
6417 Boelten Hall
UCLA
Los Angeles, California 90024

John L. Benson Non-Resident
Niagara Mohawk Power Corp.
300 Erie Blvd. W.
Syracuse, New York 13202

Mark H. Bickhard VE104
University of Texas/Austin
EDB 504
Austin, Texas 78712

Helene Barab
Guest of Mark H. Bickhard

Alexander Blount BE206
Crossroads Community Growth Center
207 Elm Street
Holyoke, Massachusetts 01040

Herbert Brun DR204
University of Illinois
1114 W. - Nevada
Urbana, Illinois 61801

Flynn Bucy EB202
George Washington Univ.
Washington, D. C. 22063

Tyrone Cashman BE409
College of St. Benedict
3428 Fremont Ave. S.
Minneapolis, Minnesota 55408

Martha Crampton VE103
Holodynamics Inc.
218 Blackrock Tpk. Redding Connecticut 06896

Jon Cunyningham BE210
The Ohio State University
1775 College Road/Accounting
Columbus, Ohio 43210

Cynthia Darling RU202
Brookings Institution
1775 Massachusetts Ave. N.W.
Washington, D. C. 20036

Lawrence deBivort BE202
Evolutionary Services Institute
5504 Scioto Road
Bethesda, Maryland 20816

Anthony Debons LE110
University of Pittsburgh
School of Library and Information Science
135 N. Bellefield Ave.
Pittsburgh, Penn. 15260

Paul Dell LE106
Eastern Virginia Medical School
205 Business Park Drive
Virginia Beach, Virginia 23462

Stuart Donn BE306
Cornell University
Education Dept., Stone Hall
Ithaca, New York 14850

Richard J. Feldmann MO207
National Institutes of Health
124/20008
Bethesda, Maryland 20205

Daniel Giacomo LE120
Philadelphia Child Guidance Clinic
34th and Civic Center Blvd.
Philadelphia, Penn. 19104

Fred Giessler PI212
Science Applications, Inc.
1710 Goodridge Drive
P. O. Box 1303
McLean, Virginia 22102

Jeff Glassman PI204
United Mime Workers Theater Co.
P. O. Box 2088 Sta. A.
Champaign, Illinois 61820

Dik Gregory DR209
U.S. Army Research Institute
Peri-SF, 5001 Eisenhower Ave.
Alexandria, Virginia 22333

Heather Harney DO101
Pangaro Incorporated
800 Third Street, N.E.
Washington, D. C. 20003

Peter M. Hejl LE112
Fachbereich #3
University of Siegen
Siegen, West Germany

Norman Hirst VE103
Holodynamics, Inc.
218 Blackrock Tpk.
Redding, Conn. 06896

Lynn Hoffman DO105
Amherst Family Study Center
P. O. Box 400
North Amherst, Mass. 01059

Erna S. Hoover RU201
A. T&T Bell Labs.
Whippany Road
Whippany, New Jersey 07981

Robert E. Horn BE302
The Lexington Institute
80 Marrett Road
Lexington, Mass. 02173

Jane Jorgenson Non-Resident
University of Pennsylvania
Annenberg School of Communications
Philadelphia, Penn. 19143

Dionysius Kallikourdis BE306
Kallikourdis & Associates
P.O. Box 17014 Kolonaki, 10024
Athens, Greece

Aron J. Katsenelinboigen LE104
Univ. of Pennsylvania
Social Systems Sciences Dept.
Vanee Hall, Spruce St. & 37th St.
Philadelphia, Penn. 19104

Louis Kauffman LE114
University of Illinois
Dept. of Math
Statistics and Computer Science
University of Illinois/Chicago
Chicago, Illinois 60680

Michael Kelly BE201
Systems Science, Watson School
SUNY-Binghamton
Binghamton, New York 13901

George F. Keyser EB204
Howard University Engineering School
Elect. Engineering Department
Howard University
Washington, D. C. 20059

Klaus Krippendorff DR208
University of Penn.
Communications C-5
Philadelphia, Penn. 19104

Donald Lamberton DR309
University of Queensland
St. Lucia, Australia 4067

John W. Lannamann Non-Resident
University of New Hampshire
Dept. of Theater & Communications
Durham, New Hampshire 03824

William Lax Non-Resident
Brattleboro Family Institute
11 Church Place
Brattleboro, Vermont 05301

Victorina Lefebvre VE111
School of Social Sciences
University of California
Irvine, California 92717

Vladimir Lefebvre VE111
University of California
School of Social Sciences
Irvine, California

Allenna Leonard MO206
ASC
University of Maryland
10270 Wilde Lake Terrace
Columbia, Maryland

Frank Leonard
10270 Wilde Lake Terrace
Columbia, Maryland 21044

Harold Linstone BE408
Portland State University
P. O. Box 751
Portland, Oregon 97207

Charles Lipp DR304
Gould Inc.
1101 E. University
Urbana, Illinois 61801

Lars Lofgren BE402
University of Lund
Box 725
Lund, Sweden S-22007

Humberto Maturana DR205
University of Chile
IAC of Sciences
Casilla 653
Santiago, Chile

Sheila McNamee Non-Resident
University of New Hampshire
Dept. of Communications
Durham, New Hampshire 03824

Michael E. Melich BE202
Naval Research Laboratory
Code 7570, 4555 Overlook Ave., S.W.
Washington, D. C. 20375

David Mitchell EB203
Concordia University
Centre for System Research
1455 Boul. de Maisonneuve
Montreal, Quebec, Canada H3G 1M8

Michael A. Morgan BE410
P. O. Box 70277
Sunnyvale, California 94086

Maria Nowakowska DO103
Machine Intelligence Inst.
Iona College
New Rochelle, New York 10801

Mark Ozer EB201
Veterans Administration SCI Service
2301 Broad Rock Road
Richmond, Virginia 23249

Paul Pangaro BE405
Pangaro Inc.
800 3rd St. N.E.
Washington, D. C. 20002

Robert Parker BE414
Defense Intelligence Agency
Central Intelligence Agency
OTE/CSI
Washington, D. C. 20505

Gordon Pask BE203
Educational Technology Program
Concordia University
Montreal, Quebec, Canada H3G 1M8

Howard Pattee VE107
T. J. Watson School of Engineering
SUNY-Binghamton
Binghamton, New York 13901

Mary Ellen Pattee
Guest of Howard Pattee

Rolf Pixley LE102
200 E. Smith Drive
Claremont, California 91711

Jean Ramaekers MO201
International Association for Cybernetics
Place A. Ryckmans
Namur, Belgium B5000

Mrs. Ramaekers
Guest of Jean Ramaekers

Eva K. Ray DO107
Medical College of Pennsylvania
1222 Prospect Hill Road
Villanova, Penn. 19085

Jean Ray RU203
Independent
28 Bradford Street
Boston, Mass. 02118

William J. Reckmeyer BE414
San Jose State University
Cybernetic Systems Program
San Jose, California 95192-0113

Laurence Richards DR208
Old Dominion University
School of Engineering
Norfolk, Virginia 23508

Bob Saron EB203
Barnes Road
Ossining, New York 10562

Robert M. Sasnor DR303
Army Research Institute
5001 Eisenhower Ave.
Alexandria, Virginia 22333

Mary R. Smith DO102
Haskins Labs
Dartmouth College, Gerry Hall
Hanover, New Hampshire 03755

Doreen Steg VE110
Drexel University
Philadelphia, Penn. 19104

Leo Steg VE110
Brookings Institution
1775 Mass. Ave. N.W.
Washington, D. C. 20036

Frederick Steier Non-Resident
University of Pennsylvania
Annenberg School of Communications
Philadelphia, Penn. 19143

Donald Tanner DR202
System Development Corp.
500 Macara Ave.
Sunnyvale, California 94086

Karl Tomm DR311
Family Therapy Program
Univ. of Calgary Medical Clinic
3350 Hospital Drive N. W.
Calgary, Alberta, Canada T2N 4N1

Paul Trachtman PI209
Smithsonian
900 Jefferson Drive W.
Washington, D. C. 20560

Valentin Turchin DR302
The City College of New York
Computer Science Dept.
140 Street at Convent Ave.
New York, New York 10031

Stuart Umpleby DR202
George Washington Univ.
Dept. of Mgt. Sciences
Washington, D. C. 20052

Francisco Varela
Max Planck Institute
Deutschorden Strasse 46
6000 Frankfurt/M, West Germany

Narayan Viswanathan DR201
Adelphi University
School of Social Work
Garden City, New York 11530

Tyler Volk BE302
Dept. of Applied Science
New York University
26 Stuyvesant Street
New York City, New York 10003

Ernst von Glaserfeld VE106
Dept. of Psychology
University of Georgia
Athens, Georgia 30602

Charlotte von Glaserfeld
Guest of Ernest von Glaserfeld

Crayton Walker LE116
University of Connecticut
U-41 Information Management
Storrs, Connecticut 06268

Frederic A. Webster LE118
Retired
(Formerly MIT Lincoln Lab & Sensory Systems Lab)
Home: Box 36
So. Pomfret, Vermont 05067

Stuart Weibel DR201
Ohio State University
500 W. 12th Ave.
Columbus, Ohio 43210

Richard Witherspoon PI207
U. S. Army
DAMO-SSM, Hq. D.A.
Washington, D. C. 20310

Milan Zeleny PI201
Fordham University
626E-GBA Fordham Univ.
at Lincoln Center
New York, New York 10023

George Zopf BE304
PAIDEIA
Box 239
Arroyo Seco, New Mexico 87514

Virginia Zeller DO106
George Washington University
2555 Pennsylvania Ave. N. W.
Washington, D. C. 20037

REPORT DISTRIBUTION LIST

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CAPT. Paul R. Chatelier
Office of the Deputy Under Secretary
of Defense
OUSDRE (E&LS)
Pentagon, Room 3D129
Washington, D.C. 20301

Department of the Navy

Engineering Psychology Program
Office of Naval Research
Code 442EP
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Arlington, VA 22217 (2 copies)

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Attn: Dr. H. Rosenwasser
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Office of Naval Research
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Arlington, VA 22217

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Attn: Dr. J. W. Tweeddale
Code 01
San Diego, CA 92152

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