

International Network for Social Network Analysis

Sunbelt XXVI

*International Sunbelt
Social Network Conference*

Coast Plaza Suite Hotel at Stanley Park

Vancouver, British Columbia

April 24-30, 2006

www.insna.org

Sponsors

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International Sunbelt Social Network Conference XXVI Vancouver, BC

Sunbelt	Year	Location	Keynote Speaker	Organizers
I	1981	Tampa	no speaker	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 and Sue Freeman
XVIII	1998	Sitges	Rolf Zeigler	José Luis Molina, Josep A. Rodríguez, Nuria R. Ávila, Frans N. Stokman, Tom A. B. Snijders, Evelien P.H. Zeggelink, Stephen P. 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	Cancún	Alvin Wolf	Jorge Gil-Mendieta, Narda Alcántra Valverde, Silvia Casasola Vargas, Jore Castro Cuellar, Alejandro Ruiz León, José Luis Molina, Samuel Schmidt, & Enrique Pérez García
XXIV	2004	Portorož	Frans Stokman	Anuška Ferligoj, Vladimir Batagelj, Andrej Mrvar, Hajdeja Igliè, Andrej Rus, Gregor Petriè, Tina Kogovšek, Matjaž Zaveršnik, Nataša Kejžar, & Darinka Kovaèè
XXV	2005	Redondo Beach	Ronald Breiger	Carter Butts, Becca Davis, Katherine Faust & Tom Valente
XXVI	2006	Vancouver	Ed Laumann	Bill Richards

Keynote Address

International Network of Social Network Analysis (INSNA)

26th Annual Sunbelt Conference

Vancouver, Canada

April 2006

A 45-year Retrospective on Doing Networks

Edward O. Laumann
University of Chicago

An informal overview of my intellectual odyssey in working empirically and intellectually on network-related topics, with some war stories about the use of networks in my professional and administrative life. The theoretical and empirical underpinnings of my approach to social networks will be highlighted.

There is little reason to expect any of you to be familiar with the particulars of my career, and especially with those aspects of it that have much bearing on my intellectual development as it pertains to my abiding interest in social network analysis. Certainly you will not know about the war stories that have come to have such an important bearing in furthering my understanding of the fundamental dynamics animating social networks. I have written extensively on a wide range of topics, notably, about organizations, elites, power and influence, politics, social stratification, health, sex and disease, but very much from a network point of view. In addition to this academic work, I have had an extensive career in academic administration, rising from Associate Chair to Editor of the *American Journal of Sociology* to Departmental Chair to Dean of the Social Sciences Division to Provost of the University of Chicago. I am currently serving as Chair of the Board of Trustees of NORC and a member of various other NGO boards that afford opportunities to observe how social scientific information is used and misused in public policy formation. With the benefit of 20/20 hindsight, one might imagine that this career is the direct result of a coherent intellectual perspective and strategy that was full born at the outset of my scholarly endeavors. But this would be woefully wrong and misleading.

My own experience strongly suggests that academic life is an unanticipated sequence of opportunities that lack definition and clarity as to what is really at stake at the time decisions are being made, e.g., whether to move or stay at an institution, to take up a particular intellectual question or not, to associate with one grouping of academics or not, and so on. For the purposes of understanding the following narrative, you need to know that some regard me as a founding figure in social network approaches to the study of society. This focus on how people and other entities form, maintain, and dissolve relationships with others and the impact of such networks on the identity and behavior of individuals and groups have been a recurrent theme in my research over the past 45 years. Not only has this interest and knowledge spurred my many research endeavors, but it has, in important measure, informed the strategies I employed in advancing my research agenda and its public presentation, and they have also informed the implementation of my administrative responsibilities, plans, and schemes.

1st Visible Path Award Winner

Nathaniel Bulkley

The International Network for Social Network Analysis (INSNA) awarded its first annual Visible Path Graduate Student Award for new research on social networks and professional performance today.

The winner, Nathaniel Bulkley, a doctoral student working with Assistant Professor Marshall Van Alstyne at the University of Michigan School of Information, conducted surveys and studied six months of email data and accounting records from an executive recruiting firm representative of professional services firms organized around client practices. An interesting finding was that characteristics of the recruiter's internal networks were statistically significant predictors of performance, but the size of their private rolodexes were not.

Bulkley's winning paper, "An Empirical Analysis of Strategies and Efficiencies in Social Networks" can be downloaded from <http://www-personal.umich.edu/~natb/>

The abstract of his paper is:

This research examines hypotheses about the efficient and strategic uses of social networks by a specific group of white collar workers. We examine existing theory that relates network structure to performance and put forward two new hypotheses. The first addition merges explore/exploit theory with social networks, proposing that optimal network characteristics evolve over the course of a career from those favoring exploration to those favoring exploitation of knowledge and relationships. The second concerns efficient movement of information through a network, proposing that frequent short communication outperforms infrequent lengthy communication. Using a unique data set containing email patterns and accounting records for several dozen executive recruiters, we find statistically significant differences related to network (1) structure (2) flow and (3) age. Consistent with existing theory, more central position is associated with higher output. Consistent with the two proposed theories, exploration strategies among early career recruiters and exploitation strategies among senior recruiters are both positively associated with performance, while more frequent shorter messages are associated with higher output. Results of this research have the potential to create a more complete understanding of different types of efficiency associated with social networks.

In brief, Bulkley's email analysis found relationships between centrality and performance, while also showing how aspects of how social networks are used relate to performance. Shorter, more frequent responses were associated with higher performance and professional's network use evolved over the course of a career from an emphasis on accumulating to exercising social capital.

Bulkley's findings suggest professional service firms may be able to develop more efficient and effective communications strategies through the use of relational measures derived from electronic data sources.

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A recent BusinessWeek story (Feb. 13) highlighted the growing popularity of dashboards that incorporate real-time data. Will future dashboards emphasize real-time relational measures?

Bulkley's research will be featured at at INSNA's Sunbelt conference in Vancouver
<http://www.insna.org/2006/sunbelt2006.html>

The presentation of the award and Buckley's talk will be Friday, April 28, 5:00 - 6:00 PM

Early last year, INSNA announced the newly-created Visible Path Graduate Student Award at the Sunbelt XXV International Social Network Conference in Redondo Beach, California. INSNA gives the annual award, which carries a \$5,000 prize plus paid expenses to the Sunbelt conference, to a graduate student in recognition of research on how social networks are used to improve individual and inter-organizational performance.

The Visible Path Graduate Student Award recognizes a graduate student's research on how social networks improve professional performance. The award is given annually to a graduate student in recognition of research at the interface between inter-organizational science and social network analysis. The award recognizes research on organizational science, in which social networks are used to improve individual and inter-organizational performance. For example, research focusing on how people in organizations, especially corporations, use their own social networks to accelerate strategic processes with people outside their organization would be eligible.

"Social network analysis touches many disciplines -- anthropology, sociology, psychology, political science, economics and communications science for starters - yet there are few awards that are specifically designed to support basic social network research," said Bill Richards, INSNA president and professor of communications at Simon Fraser University. "This award seeks to encourage research for benefit of everyone who is interested in the juncture of social network analysis and organizational performance."

The award taps into broadening awareness of social network analysis sparked by articles, popular business books and new companies selling web services and software that capitalize on social networks.

"The timing is right for graduate students looking to uncover social network insights that can advance an increasingly popular discipline with growing opportunities for application" said Stanley Wasserman, professor of sociology, psychology, and statistics at Indiana University and chief scientist for Visible Path Corp. in New York."

To apply for this year's award, students should submit a paper (written in English) to the committee before 1 September 2006. The paper must be written between September 1, 2005 and August 31, 2006. Eligible students must be sole (or first) author on the submitted paper. Letters of support should accompany the submission. Submitted papers will be evaluated by a committee of four judges; their decision will be final. Judging will be on the basis of the level of originality in the ideas and techniques, the possible applications and their treatment, and potential impact. The awardee will give a formal presentation at Sunbelt 2007 in Greece. The committee may arrive at the conclusion that none of the submitted papers merits the award.

The award will made for the second time in 2007. Funds for the award have been provided by Visible Path Corporation, New York (<http://www.visiblepath.com>).

Details for the 2007 Visible Path Graduate Student award will be announced shortly.

2006 Vancouver Symposium on sex, drugs, and social networks

April 24-25, 2006

9:00 am to 5:00 pm Monday, April 24 and 9:00 am to noon Tuesday April 25

This symposium will provide an opportunity for leading social networks researchers, infectious disease epidemiologists, and public health practitioners to discuss their common problems and approaches. It will be organized around some of the puzzles and difficulties that face us. Our discussions will be guided by approximately 6 or 7 papers that will be distributed in advance and outlined by their authors at the meeting itself.

We have prepared a series of questions (see below) to use as an organizing tool and to guide the potential authors of materials for the meeting.

The Symposium will specifically focus on social networks, drug networks (including those of the users of drugs, those of the neighborhoods in which drugs are used, those of the suppliers of drugs, and the related policing and governmental agencies), and the sexual networks through which STDs spread. It will consider HIV, tuberculosis, syphilis and hepatitis. One practical issue that will be an important part of the discussion will be how the ideas raised at the meeting help us to understand and/or to intervene in the HIV and hepatitis epidemics in Vancouver — but materials and issues will range more broadly than this.

To give some coherence to the sessions, we invited papers addressing specific topics prepared for distribution to all participants a few weeks before the meeting takes place. While Vancouver would make an appropriate location to use to illustrate most of the relevant issues, we intend to encourage the authors of the papers to take a more general approach so they may include issues particular to other locations as well as ones seen in Vancouver. Some of these papers will also be presented at the Sunbelt conference that will fill most of the rest of the week.

Questions to focus and guide discussion:

1. What network phenomena can shape epidemics and the responses to epidemics? These might include social influence networks, bridges between groups (HIV- and HIV+, IVDU and non-IVDU sex partners, etc...), political networks and organizations.
2. What local social phenomena help shape these networks? Possibilities include various kinds of social pressures, behaviour, event occurrence and event attendance, the epidemics themselves, local neighborhood stakeholders, and relevant bureaucratic structures.
3. What more general factors shape social, sexual and drug-related networks? How does this happen? Possibilities include norms? customs? politics? policing? economics? We must go far beyond simple propinquity as explanations!

4. What kinds of data do we need to collect to study these issues? Which of these data are routinely available? Which are normally collected in epidemiologic or political research? Which require network designs? Specifically, what data — social network and other — are already available in Vancouver? or elsewhere? and how might we go about designing appropriate studies?
5. What kinds of simple interventions might reduce HIV and STD spread ? And how do sexual network patterns affect their impact ? And do political or workplace network dynamics or structures affect their feasibility ; or is this more an issue of non-network-based norms, values or interests ? For example, given the extent to which IVDUs and other drug users are a core for some STDs : How are their social networks connected to the larger communities of drug users and ordinary residents? why is there so little STD screening, cure, or therapy at drug treatment, needle exchange, and safe injection sites ?
6. How do transportation networks affect risk networks and social networks? In India and parts of Africa, truck routes seem to affect HIV transmission dynamics. In Vancouver, does the Skytrain structure crime ? drug use ? HIV or STDs ?
7. What is the agenda for network research in relation to wars, transitions, natural disasters, urban redevelopment and other "big events"?

The following papers are available for download:

"Big Events" and Networks.

Samuel Friedman, National Development and Research Institutes, Inc., New York, Department of Epidemiology, Bloomberg School of Public Health, Johns Hopkins University; Diana Rossi, Intercambios Civil Association, Buenos Aires, Argentina; Peter L. Flom, National Development and Research Institutes, Inc., New York.

Gender and Chain Reactions in Teenagers' Social Networks.

Deirdre M. Kirke, National University of Ireland, Maynooth.

The Effect of Personal Network Exposure on Injecting Equipment Sharing among IDUs in Budapest, Hungary.

V. Anna Gyarmathy, NDRI and Johns Hopkins Bloomberg School of Public Health; Alan Neaigus, NDRI and Columbia University, Mailman School of Public Health.

Social Networks and Mathematical Modeling.

Ann Stanley, Bend, Oregon.

Homophily and assimilation among sportactive adolescent substance users.

Michael Pearson, Napier University, Edinburgh; Christian Steglich and Tom Snijders, University of Groningen.

A selection from the following papers will be presented and discussed:

Evaluation of partner notification for syphilis; before and after enhanced social network strategies; Vancouver, Canada.

Ann Jolly, Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control; Darlene Taylor, British Columbia Centre for Disease Control STD Division Epidemiology Services; Gina Ogilvie, British Columbia Centre for Disease Control STD Division Epidemiology Services; Michael Rekart, Director, STD/AIDS Control, BCCDC and Clinical Professor, Medicine, UBC.

Sex partner concurrency in a high HIV prevalence community.

Caroline Korves Columbia University Mailman School of Public Health New York, New York USA; Maureen Miller, Columbia University Mailman School of Public Health New York, New York USA.

The importance of “house regular” clients and bridging in sexual networks of massage parlour-based commercial sex workers (CSW) in Vancouver, Canada.

Valencia Remple, University of British Columbia, BC Centre for Disease Control Epidemiology, Vancouver, BC; David M Patrick, UBC, BCCDC Epidemiology Vancouver, BC; Mark W Tyndall, BC Centre for Excellence in HIV/AIDS Vancouver, BC; Caitlin Johnston, BC Centre for Excellence in HIV/AIDS Vancouver, BC; Ann Jolly, Public Health Agency of Canada, Centre for Infectious Disease Prevention and Control.

Comparison of networks resulting from respondent driven sampling and a social network inventory.

Elizabeth Costenbader, and William A. Zule, Research Triangle Institute, International, Behavioral Health Research Division, Substance Abuse Treatment Evaluations Intervention; Georgiy Bobashev, Research Triangle Institute, International, Social and Statistical Sciences.

Degree Distributions of Sexual Networks: Should We Buy Scale Free.

Deven Hamilton, University of Washington, Sociology; Mark Handcock, University of Washington, Sociology and Statistics.

Connectivity, Density, and Diffusion: Low degree networks can be as effective as scale free.

Martina Morris, University of Washington, Department of Sociology; David Hunter, Penn State University, Department of Statistics; Jim Moody, Ohio State University, Department of Sociology.

Effects of TND Network on Monthly Substance Use.

Thomas Valente, Alan Stacey, Jennifer Unger, Steve Sussman, all from University of South California, Department of Preventive Medicine.

The Winnipeg Injection Drug Use Social Network study: the molecular epidemiology of hepatitis C within social networks of injection drug users.

John Wylie, Cadham Provincial Laboratory, Winnipeg, Manitoba; Ann Jolly, Centre for Infectious Disease Prevention and Control, Population and Public Health Branch, Health Canada; Lena Shah, Department of Community Health Sciences Faculty of Medicine University of Manitoba Winnipeg, Manitoba.

Assessing the Effects of Social Network Variables on Project Retention: It’s How You See Them Not How They See You That Matters.

Scott Clair, Richard Spoth, ChungYeol Shin, Cleve Redmond, all from Iowa State University, Partnerships in Prevention Science Institute.

Exposure to Cognitions through social networks leads to Marijuana & Alcohol Use.

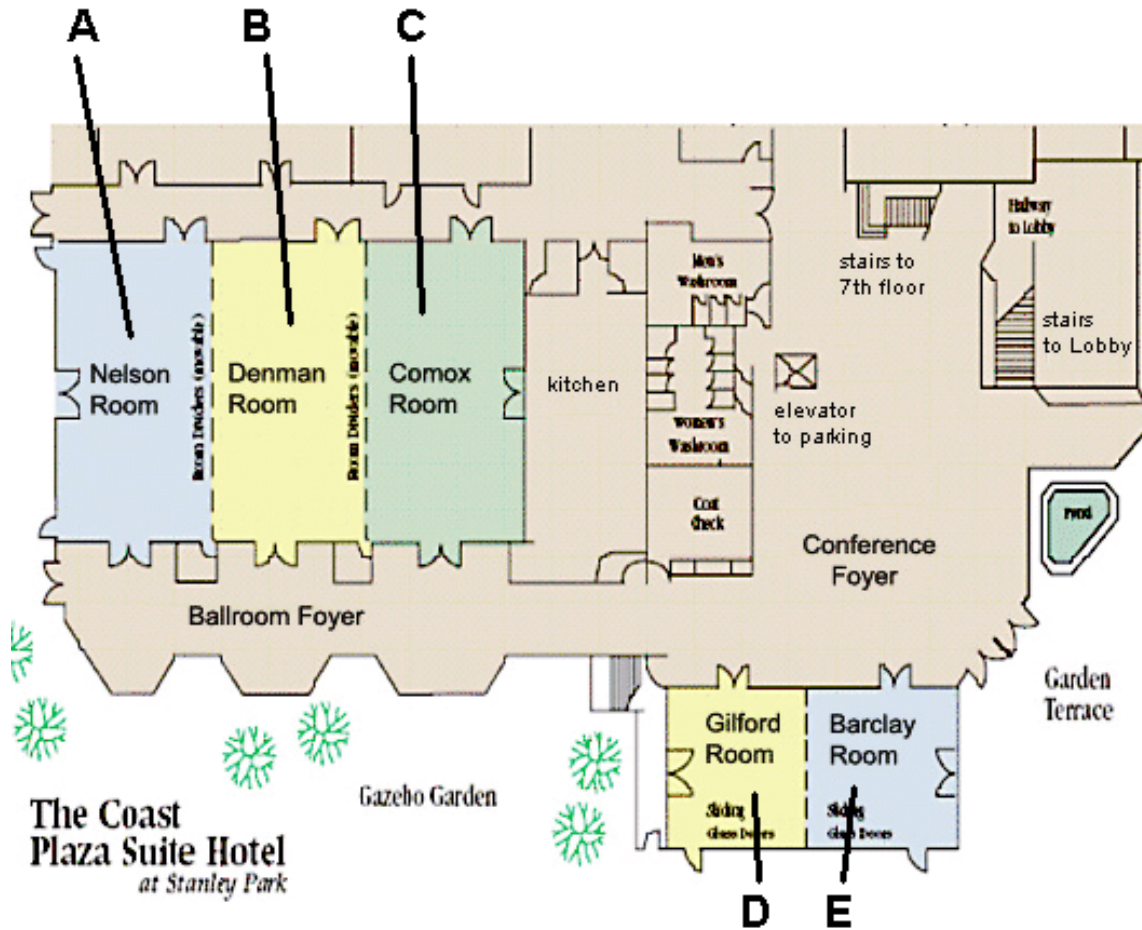
Kathryn Coronges, Tom Valente, Alan Stacy, all from the Institute of Prevention Research University of Southern California.

The relative contribution of sex and drug ties to STI-relevant network connectivity.

James Moody and Jimi Adams, both from The Ohio State University, Sociology.

Substance-based Informal Social Networks: Investigation into Stronger Ties.

Michael Read, Ph.D. Student University of British Columbia Sauder School of Business OBHR Division.



Wednesday 3

- a) Collecting Network Data A
- b) Network Autocorrelation Analysis
- c) Networks and Teams
- d) Missing Data
- e) 21 Innovation, Organizations, Networks, and Technology

Wednesday 4

- a) Intra-Organizational Networks and Job Performance
- b) Personal Networks A
- c) Infectious Diseases and Social Networks A
- d) Missing Data
- e) Innovation, Organizations, Networks, and Technology

Thursday 1

- a) Social Influence and Diffusion
- b) Personal Networks B
- c) Sex, Drugs, and Social Networks A
- d) Computer Networks as Social Networks
- e) Inter-Organizational Networks A

Thursday 2

- a) Visualization A
- b) Corporate and Inter- Organizational Networks A
- c) Adolescent Friendship Networks A
- b) Collecting Network Data B
- e) 9 Complexity

Thursday 3

- a) Gender and Social Capital
- b) Adolescent Friendship Networks B
- c) Inter-Organizational Networks B

Thursday 4

- a) Methods
- b) Corporate and Inter- Organizational Networks B
- c) Infectious Diseases and Social Networks B
- d) On-Line Communities A
- e) Inter-Organizational Networks C

Friday 1

- a) Vizards Session
- b) Opinion Leaders and Diffusion
- c) Sex, Drugs, and Social Networks B
- d) Intra-Organizational Networks A
- e) Trust, Uncertainty and Advantage

Friday 2

- a) Technology adoption and social networks
- b) Prospects and problems in social network analysis
- c) Network Dynamics A
- d) Politics and Network Structures
- e) Entrepreneurial Networks

Friday 3

- a) Exponential Random Graphs
- b) Social Capital, Social Influence and Diffusion
- c) 2-Mode Networks
- d) On-Line Communities B
- e) Status, Wealth, Power and Control

Friday 4

- a) Semantic Network Analysis
- b) Algorithms and Analytic Methods A
- c) Visualization B
- d) Intra-Organizational Networks B
- e) Friendship networks

Saturday 1

- a) High Techification of Social Networks
- b) Academic Scientific Networks A
- c) Sampling methods
- d) Social Capital.
- e) Networks, Collective Action and Social Movements A

Saturday 2

- a) Networks and Emotions
- b) Algorithms and Analytic Methods
- c) Criminals, Gangs, Terrorists, and Networks B
- d) Small World Research
- e) Qualitative Approaches A

Saturday 3

- a) Network Theory
- b) Political Networks
- c) centrality Measures in Social Networks
- d) Innovations
- e) Social Support

Saturday 4

- a) Mathematical Models
- b) Statistical Methods
- c) Network Dynamics B
- d) Intra-Organizational Networks C
- e) Qualitative Approaches B

Sunday 1

- a) Networks, Economics, and Marketsb)
- b) Networks and Science
- c) UInterlocking Directorates
- d) Networks, Collective Action and Social Movements B
- e) Exchange Networks / Game Theory

Sunday 2

- a) Academic Scientific Networks B
- b) Simulation
- c) International Networks
- d) Communication Networks
- a) Statistical Network Models

Wednesday 3

Sunbelt
Paper
Presentation
Schedule

Wed April 26	a) 7a Collecting Network Data A	b) 31 Network Autocorrelation Analysis
1:40-2:00	111 - Entity Resolution in Social Networks <i>Lise Getoor, Indrajit Bhattacharya</i>	249 - Autocorrelation in Social Networks: A Preliminary Investigation of Sampling Issues <i>Antonio Paez, Darren Scott, Eric Volz</i>
2:00-2:20	188 - Deconstructing the tie: behavioral and self-report measures of relationships <i>David Lazer Nathan Eagle and Alex (Sandy) Pentland</i>	336 - Network Autocorrelation Analysis: A Comparative Specification Study of Planting Decision Making Process <i>Satoru Watanabe, Yoichiro Higuchi</i>
2:20-2:40	285 - A Database Perspective of Social Network Analysis Data Processing Interest in social networks is becoming pervasive and data volumes increase <i>Mauro San Martín, Miguel Aguirre Perry, Claudio Gutierrez</i>	337 - Network Autocorrelation Analysis: New Application Possibilities of Direct Estimation Method for Weight Structure Matrix <i>Satoru Watanabe, Yoichiro Higuchi</i>
2:40-3:00	346 - Creating Dynamic Social Network Models from Sensor Data <i>Danny Wyatt, Tanzeem Choudhury, Henry Katz, James Kitts</i>	337 - Network Autocorrelation Analysis: New Application Possibilities of Direct Estimation Method for Weight Structure Matrix <i>Satoru Watanabe, Yoichiro Higuchi</i>
3:00-3:20	coffee	coffee

c) 36 Networks and Teams	d) 30 Missing Data	e) 21 Innovation, Organizations, Networks, and Technology	Wed April 26
93 - I'd Like to Thank the Academy, Multiplicative Productivity, and Social Networks <i>Nicole Esparza, Gbriel Rossman</i>	152 - Missing Information: The impact of missing data in a network analysis <i>Timothy Huerta</i>	11 - Determining Factors in the Usage of Software Applications By End Users in a Not-for-Profit Environment <i>Bonnie Anderson, Kathleen Carley, David Krackhardt</i>	1:40-2:00
131 - Social network analysis as a tool for intra-org-anizational development in an aerospace project team over time and role commitment <i>Kristie Hansen, Dimitris Assimakopoulos</i>	155 - Missing data in networks: longitudinal data analysis with missing observations <i>Mark Huisman, Cristian Steglich</i>	73 - Engineered Innovation: a framework for analyzing the 2nd order effects of Diffusion and Social Network Analysis <i>Eric Daimler</i>	2:00-2:20
242 - Social Networks, Social Identity and Role Conflict in Work Groups <i>Riku Nikkilä</i>	261 - Network Inference with Missing Data: a Performance Comparison of Existing Methods <i>Miruna Petrescu-Prahova, Carter T. Butts</i>	116 - Accelerating the Diffusion of Innovations: A "Digital Diffusion Dashboard" methodology for global networked organizations <i>Julia Gluesing, Kenneth Riopelle, James Danowski</i>	2:20-2:40
264 - Already Got a Date? Reciprocal Preferences, Relationship Development and Performance in Teams <i>Joerg Raab, Ptru Curseu, Patrick Kenis</i>	330 - Did you miss me? Missing data in social network analysis <i>Christian Waldstrøm, Kent Wickstrøm Jensen</i>	313 - The Role of Simmelian Ties in the Generation of Innovation <i>Marco Tortoriello, David Krackhardt</i>	2:40-3:00
coffee	coffee	coffee	3:00-3:20

Wednesday 4

Wed April 26	a) 26 Intra-Organizational Networks and Job Performance	b) 41a Personal Networks A
3:20-3:40	13 - Nice to See You, But Send Me an E-mail: Social Capital and Individual Performance in Distributed Teams <i>Priscilla Arling, Mani Subramani</i>	7 - Internet usage and social network characteristics in contemporary Hungarian society. A longitudinal analysis. <i>Fruzsina Albert</i>
3:40-4:00	186 - A relational perspective on new hire integration <i>Jennifer Kurkoski</i>	137 - When exactly do social relations become a resource? <i>Marina Hennig</i>
4:00-4:20	281 - Social and spatial networks of the learning organisation <i>Kerstin Sailer, Stephen Pryke</i>	206 - Bourdieuan Class and the Socio-logic of Affiliation Choices <i>Omar Lizardo</i>
4:20-4:40	292 - Informal Network Isolates and Individual Performance: Can Isolates Perform Better than Central Employees? <i>Neha Shah</i>	294 - Maintaining the old and building the new: Personal relationships after a residential move <i>Irina Shklovski, Robert Kraut, Jonathon N. Cummings</i>
4:40-5:00	349 - Contracts and Cliques: An Organizational Response to Short-Term Labor Market Uncertainties <i>Valery Yakubovich</i>	333 - The development of personal friendship networks <i>Zhigang Wang</i>

c) 19a Infectious Diseases and Social Networks A	d) 30 Missing Data	e) 21 Innovation, Organizations, Networks, and Technology	Wed April 26
106 - Research issues regarding "Big Events," changes in risk networks, and the spread of HIV <i>Samuel Friedman, Diana Rossi, Peter L. Flom</i>	5 - Contextualizing Weak Ties in Service Encounters <i>Mara Adelman</i>	81 - Wis a on the Sound:Information Grounds and Identity in Seattle's Polish Community <i>Tom Dobrowolsky</i>	3:20-3:40
165 - Evaluation of partner notification for syphilis; before and after enhanced social network strategies; Vancouver, Canada. <i>Ann Jolly, Darlene Taylor, Gina Ogilvie, Michael Rekart</i>	156 - How to Build Useful Neighborhood Information Systems:Leveraging Public Private Partnership Network for IT innovation <i>Sungsoo Hwang</i>	117 - Ethnic Contingencies of Closure and Brokerage-Based Forms of Social Capital in the Context of Education <i>Marco Gonzalez</i>	3:40-4:00
181 - Sex partner concurrency in a high HIV prevalence community <i>Caroline Korves, Maureen Miller</i>	280 - Using Social Network Analysis to Explore and Predict Performance in Public- Private Partnerships: a case-based analysis of Genomics- based R&D Networks <i>Camille (Cami) Ryan</i>	121.5 - Mapping Artistic, Cultural, and Network Assets in the Chicago Metropolitan Area: Context, Project Design, Implementation, and Initial Findings <i>Harold Green, Sean Mason, Noshir Contractor, Alaka Wali, Rebecca Severson, Josh Ostergaard, Heather H. McClure</i>	4:00-4:20
227 - HIV serostatus mixing patterns in sex partnerships in an African American community <i>Maureen Miller, Caroline Korves, Yuyan Liao</i>	339 - Cross Talk? The Role of Neighborhood Associations in Political Discourse <i>Christopher Weare, Juliet Musso</i>	247 - Ethnography and Social Network Analysis as Complimentary Methodologies for the Study of Artistic, Cultural and Networking Practices among Recent Mexican Immigrants in the Chicago Metropolitan Area <i>Heather McClure, Alaka Wali, Rebecca Severson, Harold Green, Noshir S. Contractor</i>	4:20-4:40
273 - The importance of "house regular" clients and bridging in sexual networks of massage parlour- based commercial sex workers (CSW) in Vancouver, Canada. <i>Valencia Remple, David M Patrick, Mark W Tyndall, Caitlin Johnston, Ann Jolly</i>	342 - Public sector brokerage: The effects of public sector interventions on regional competitiveness <i>Leroy White, Dimitrios Christopoulos</i>	300 - Double Take: Using Egonet to Measure Transnational Social Relations <i>Ermitte St. Jacques</i>	4:40-5:00

Thursday 1

Thursday April 27	a) 53 Social Influence and Diffusion	b) 41b Personal Networks B
8:40-9:00	41 - Does interaction in workplace favor organizational identification? Evidence from three consulting firms <i>Cristina Broch</i>	215 - The effects of multiplexity of support providers and strong ties' visualization on viewers' perception of personal networks <i>Isidro Maya-Jariego</i>
9:00-9:20	86 - A Balance Theory Approach to Group Problem Solving <i>P. Robert Duimering, Gbemisola Abimbola, Zhehui Zhong</i>	216 - Personal network composition and structure as proxies for acculturation of migrants <i>Christopher McCarty, Jose Luis Molina</i>
9:20-9:40	104 - Group Decision Making <i>Noah Friedkin, Eugene Johnsen</i>	228 - Personal network visualization as a cue for interviewing migrants <i>Jose Luis Molina, Christopher McCarty,</i>
9:40-10:00	161 - Social Influence Network Theory: Explanatory and Predictive Fits of the Standard Model <i>Eugene Johnsen</i> <i>In collaboration with Noah E. Friedkin</i>	229 - Where have you met each other? How meeting places affect personal relationships <i>Gerald Mollenhorst, Beate Völker, Henk Flap</i>
10:00-10:20	351 - The Social Structure of Freedom: A Structural Analysis of the New York Capital Region's Underground Railroad Activity <i>Nicholas Young, Binod Sundararajan, Paul Stewart, Mary Liz Stewart</i>	278 - Birds of a feather and birds of a tether: Distinguishing homophily and social influence. <i>Brian Rubineau, Carol Chetkovich, David Lazer</i>
10:20-10:40	coffee	coffee

c) 48a Sex, Drugs, and Social Networks A	d) 10Computer Networks as Social Networks	e) 24a Inter-Organizational Networks A	Thursday April 27
12 - The Symbiotic Business Relationship between the Internet and the Sex Industry: Its Impact on the Creation of Global Sex Networks <i>Sevgi Aral</i>	144 - Email reciprocity and personal communication biases <i>Bernard Hogan, Danyel Fisher</i>	6 - Collaborating and Competing? On the Dynamics of Value Creation and Value Appropriation in Strategic Alliances <i>federico Aime</i>	8:40-9:00
164 - The Impact of Preventive Group Intervention on Adolescents' Education-related Social Ties and Satisfaction with Education <i>Markku Jokisaari, Jukka Vuori</i>	255 - A hyperlink network analysis of citizen blogs in South Korean politics <i>Han Woo Park, Nicholas Jankowski</i>	252 - The network effect of the relations between social cooperatives and municipalities in a small Italian territory <i>Laura Palombo, Luca Bartoli, Giulia Rivellini</i>	9:00-9:20
177 - How Do HIV Positives Find Sexual Partners?: Networked Sex and the Internet <i>Emmanuel Koku</i>	282 - Who does ego-network influence information and communication technologies appropriation? <i>Johanne Saint-Charles, Sarah Deraps, Danielle Belanger, Proulx Serge</i>	268 - The Organization of Innovation: Integrated versus Core-Periphery Structures in Regional Biotechnology Networks <i>Olaf Rank, Charlotte Rank, Andreas Wald</i>	9:20-9:40
319 - Effects of TND Network on Monthly Substance Use <i>Thomas Valente, Alan Stacey, Jennifer Unger, Steve Sussman</i>	334 - Size, Resource Exchange and Sustainability in an Online Social Network <i>Molly Wasko, Catherine Ridings</i>	318 - A social network model to describe the links between departments and to redesign core processes in public administration. <i>Luis Valadares Tavares</i>	9:40-10:00
347 - The Winnipeg Injection Drug Use Social Network study: the molecular epidemiology of hepatitis C within social networks of injection drug users <i>John Wylie, Ann Jolly, Lena Shah</i>	341 - The Strength of Internet Ties <i>Barry Wellman, Jeffrey Boase, John Horrigan, Lee Rainie</i>	325 - How resourceful is a firm? The impact of a firms' resource base on its network strategy in the Dutch insurance industry. <i>Diederik van Liere, Otto Koppius</i>	10:00-10:20
coffee	coffee	coffee	10:20-10:40

Thursday 2

Thursday April 27	a) 60a Visualization A	b) 11a Corporate and Inter-Organizational Networks A
10:40-11:00	89 - Two Approaches for Examining Longitudinal Social Networks <i>Benjamin Elbirt, George Barnett</i>	100 - Booking the bazaar: The social structure of exchange in a local cultural market <i>Pacey Foster</i>
11:00-11:20	91 - Visualization of regions in a network <i>Kent Engø-Monsen, Geoffrey Canright, Åsmund Weltzien</i>	120 - The Structural Dynamic of Auditor Switching <i>Douglas Grbic</i>
11:20-11:40	102 - Sociomaps: An implementation of advanced visualization technology to the exploration of large social networks <i>Terrill Frantz, Mike Schneider, Kathleen Carley</i>	307 - Which ties matter? Understanding clients' perspectives on external professional service provision <i>Yuliani Suseno, Ashly Pinnington</i>
11:40-12:00	115 - Visualizing Temporal Social Networks in Context – Adding Content Analysis to TeCFlow <i>Peter Gloor, Yan Zhao</i>	331 - Instrumental Rationality or Embeddedness: Tie Formation and Renewal between Limited Partners and Venture Capital Firms <i>Chunlei Wang</i>
12:20-1:40	lunch	lunch

c) 3a Adolescent Friendship Networks A	b) 7 Collecting Network Data B	e) 9 Complexity	Thursday April 27
175 - Determinants of gender composition and structure of peer groups in a community <i>Deirdre Kirke</i>	132 - Network Genie: An Online Strategy for Designing Social Network Surveys and Collecting Social Network Data <i>William Hansen, Kelvin Bryant, Eric Reese, Cheryl Wyrick</i>	27 - Complex Networks: A Simulation Study <i>Phillip Bonacich</i>	10:40-11:00
176 - Dynamics of friendship and behavior in early adolescence <i>Andrea Knecht</i>	169 - Dual Frame Sample Surveys as a tool for Analyzing Community Structures <i>Charles Kadushin, Benjamin Phillips</i>	190 - The Emergence of Social Networks: Upward, Downward and Iterative Social Pattern Formation Processes <i>Mandy S. Lee, Robert Bichler, Celina Raffl, Jeanette Voas</i>	11:00-11:20
308 - Transitivity, Intersecting Parameters, & Intergroup Relations <i>Reuben Thomas</i>	355 - One in Four Is Enough – Strategies for Selecting Ego Mailboxes for a Group Network View <i>Antonio Zilli, Francesca Grippa, Peter Gloor, Robert Laubacher</i>	199 - Using Network Analysis for Effectively Placing Gate in a Semi-Opened Electronic Ticketing System in Railway Networks <i>Ting Li, Peter Vervest, Eric van Heck</i>	11:20-11:40
189 - A Relational Model of Behavioral Intention for Sharing Computer Software <i>Jegoo Lee</i>		315 - Newtonian Mechanics of Social Networks <i>Maksim Tsvetovat, Elizabeth Warner</i>	11:40-12:00
lunch	lunch	lunch	10:20-10:40

Thursday 3

Thursday April 27	a) 18 Gender and Social Capital	b) 3b Adolescent Friendship Networks B
1:40-2:00	98 - Tipping points: Referral homophily and job segregation <i>Roberto Fernandez, Brian Rubineau</i>	31 - Influence processes in social drinking; Observations of modelling and persuasion in young adult peer groups <i>Sander Bot, Rutger Engels, Ronald Knibbe, Wim Meeus</i>
2:00-2:20	211 - How Occupational Characteristics Influence the Importance of Qualifications and Gender in the Flow of Job Information from Weak Ties <i>Alexandra Marin</i>	143 - Multiple methods for measuring peer influence and peer selection for adolescent smoking <i>Beth Hoffman, Peter Monge, Thomas Valente</i>
2:20-2:40	323 - The downside of social capital: examining the crab syndrome <i>Renee Van der Hulst</i>	250 - Social-capital Effects on Adolescent Dating Norms <i>Anthony Paik, Jennifer Glanville, Vernon Woodley</i>
2:40-3:00	coffee	coffee

c) 24b Inter-Organizational Networks B	d)	e)	Thursday April 27
45 - Social capital of healthcare agencies <i>Peter Busse, Morgan Lyons</i>			1:40-2:00
135 - Watched by Many: How Legitimacy Concerns Drive HIV/AIDS Activist NGOs' Linkage Decisions <i>Bettina Heiss, Peter Monge</i>			2:00-2:20
172 - Structural and organizational factors that inhibit or facilitate knowledge transfer in networks <i>Derk Jan Kiewiet, Marjolein Achterkamp, Jo van Engelen</i>			2:20-2:40
coffee	coffee	coffee	2:40-3:00

Thursday 4

Keynote Address
Edward Laumann
5:00 - 6:00

Banquet
7:00 - 8:15

Global Warming and
Canadian Arctic
Networks:
Economic, Cultural,
Biological, Military
8:150 - 9:00

Thursday April 27	a) 28 Methods	b) 11b Corporate and Inter- Organizational Networks B
3:00-3:20	33 - Triad census statistics for a random graph model <i>John Boyd, Akishige Kishida</i>	52 - World Corporate Network: Interlocking directorates around the world <i>Julian Cardenas</i>
3:20-3:40	96 - Very Local Structure in Social Networks <i>Katherine Faust</i>	71 - Social Diffusion of Business Strategy: Mimetic and Collaborative Processes in Business Decisions to Expand Overseas <i>Bruce Cronin</i>
3:40-4:00	147 - Eigensysteme Analysis of a mobile phone data set <i>Bettina Hoser, Carsten Siegmund</i>	139 - Reputation and Organizational Foundings: Evidence from Tsarist Russia, 1700-1914 <i>Henning Hillmann, Brandy Aven</i>
4:00-4:20	197 - Negative Networks: Cluster and Divide <i>Juergen Lerner, Ulrik Brandes, Daniel Fleischer</i>	195 - The Diffusion of Enterprise Resource Planning: A Network Epidemiology Perspective <i>Pierre-Majorique Leger, Babin Gilbert, Pellerin Robert</i>
4:20-4:40	320 - Bridges and Potential Bridges: Changing Links to Find Critical Paths and Nodes in a Network <i>Thomas Valente</i>	283 - Immigrants and the Job Search: Comparing the Internet and Social Networks <i>Janet Salaff, Arent Greve, Elic Chan</i>

c) 19b Infectious Diseases and Social Networks B	d) 39a On-Line Communities A	e) 24c Inter-Organizational Networks C	Thursday April 27
68 - Comparison of networks resulting from respondent driven sampling and a social network inventory <i>Elizabeth Costenbader, William A. Zule, Georgiy Bobashev</i>	49 - The social network of an online university <i>Agustí Canals, Josep Cobarsí</i>	6 - Collaborating and Competing? On the Dynamics of Value Creation and Value Appropriation in Strategic Alliances <i>federico Aime</i>	3:00-3:20
90 - Spreading on Networks <i>Kent Engø-Monsen, Geoffrey Canright</i>	57 - Investigating Evolution of Community in Blogs <i>Alvin Chin, Mark Chignell</i>	24 - Predictors of Dyadic Interaction in Emergent Multiorganizational Networks Following the World Trade Center Attacks <i>Christine Bevc, Carter Butts, Sophia Liu, Kathleen Tierney</i>	3:20-3:40
129 - Degree Distributions of Sexual Networks: Should We Buy Scale Free <i>Deven Hamilton, Mark Handcock</i>	243 - Mapping Student Roles between Physical and Online Discussion Networks <i>Robert Nolker, Lina Zhou</i>	207 - Corporate Social Capital impacts on Market Performance in the IT Software and Services Sector <i>Laurence Lock Lee</i>	3:40-4:00
233 - Connectivity, Density, and Diffusion: Low degree networks can be as effective as scale free <i>Martina Morris, David Hunter, Jim Moody</i>	253 - The structure and evolution of an online communication network <i>Pietro Panzarasa, Tore Opsahl</i>	219 - Social Network application in external Knowledge search <i>Dr Fergal McGrath, Rebecca Purcell</i>	4:00-4:20
327 - The Global Structure of Networks and Veterinary Disease <i>Matthew Vernon, Cerian Webb, Fred Heath</i>	340 - Connected Lives: The Project <i>Barry Wellman, Bernie Hogan, Kristen Berg, Jeffrey Boase, Rochelle Cote Juan-Antonio Carrasco, Jennifer Kayahara Tracy L.M. Kennedy, and Phuoc Tran</i>	271 - Running in Place: Status and Identity in Interorganizational Influence Structures <i>Craig Rawlings</i>	4:20-4:40

Friday 1

Friday April 28	a) 61 Viszards Session	b) 40 Opinion Leaders and Diffusion
8:40-9:00	At the Sunbelt XXII 'Viszards session', we presented different analyses and visualizations of the media coverage of the September 11 terrorist attacks, at Sunbelt XXIII we analyzed 'The Summer Joker' network, at Sunbelt XXIV our attention was on the players market of the football World Championship 2002, and at	17 - Advice and Influence: The flow of advice and the Diffusion of Innovation <i>Juan Carlos Barahona, Alex(Sandy) Pentland</i>
9:00-9:20	Sunbelt XXV we analyzed KEDS (The Kansas Event Data System) networks about political events in critical regions such as Middle East and Balkans. This session features a single, joint presentation by all contributors. Our aim is to demonstrate the richness and power of network analysis, in particular when supported by visualization. We therefore present a multi-perspective analysis of a single data set, utilizing a broad range of visualization methods. This year we will analyze IMDB (The Internet Movie Database) networks.	54 - Co-Authorship Network Position and the Adoption of Innovations: Implications for Diffusion of New Knowledge <i>Jennifer Chandler, Samantha Cross</i>
9:20-9:40		107 - Hierarchical Structures in Interpersonal Communication Networks <i>Thomas N. Friemel</i>
9:40-10:00	Vladimir Batagelj Katy Borner Ulrik BrandesKonstanz, Seok-Hee Hong Sydney, Australia	140 - Online Discussions and Flow Leaders <i>Itai Himelboim, Shawn Lavelle</i>
10:00-10:20	Jeffrey C. Johnson Lothar Krempel Andrej Mrvar Jurgen Pfeffer	321 - Identifying Physician Opinion Leaders from City Surveys <i>Thomas Valente, John Eichert, Bruce West, Van den Bulte Christophe</i>
10:20-10:40	coffee	coffee

c) 48b Sex, Drugs, and Social Networks B	d) 25a Intra-Organizational Networks A	e) 59 Trust, Uncertainty and Advantage	Friday April 28
59 - Assessing the Effects of Social Network Variables on Project Retention: It's How You See Them Not How They See You That Matters <i>Scott Clair, Richard Spoth, ChungYeol Shin, Cleve Redmond</i>	72 - Where you are relative to others in your network: Implications for distributed work in organizations <i>Jonathon N. Cummings, Mark de Rond</i>	14 - The effect of trust on the accuracy of design development information flows in UK construction new procurement systems: A social network analysis approach <i>Sulafa Badi, Stephen Pryke</i>	8:40-9:00
64 - Exposure to Cognitions through social networks leads to Marijuana & Alcohol Use <i>Kathryn Coronges, Tom Valente, Alan Stacy</i>	84 - Combining traditional survey and social network measures of group cohesion: A longitudinal study <i>Anne-Maree Dowd, Neil Paulsen</i>	20 - Gender, Network Social Capital and Social Trust <i>Susan Bastani, Maryam Salehi hikoi</i>	9:00-9:20
231 - The relative contribution of sex and drug ties to STI-relevant network connectivity <i>James Moody, jimi adams</i>	122 - Exploring the Contributions of Human and Social Capital to Productivity <i>Arent Greve, Mario Benassi, Arne Dag Sti</i>	110 - Leveraging Social Networks to Aid in Online Trust Assessment <i>Alla Genkina</i>	9:20-9:40
259 - Homophily and Assimilation among Adolescent Substance Users <i>Michael Pearson, Christian Steglich, Tom Snijders, Patrick West</i>	124 - E-mail May Not Reflect The Social Network <i>Francesca Grippa, Antonio Zilli, Robert Laubacher, Peter Gloor</i>	272.5 - Structural Properties of Power-Relevant Relations <i>Leah Reich, Carter Butts</i>	9:40-10:00
271.5 - Substance-based Informal Social Networks: Investigation into Stronger Ties <i>Michael Read</i>	269 - Interdependencies between Reputation, Friendship, and Cooperation in Networks of Strategy-Making <i>Olaf N. Rank, Marijtje A.J. van Duijn</i>	305 - Cupid Alliances: Exploring Behavior Dynamics During Alliance Formation Between Unembedded Firms <i>Kim Stephens, Janet Fulk, Peter Monge</i>	10:00-10:20
coffee	coffee	coffee	10:20-10:40

Friday 2

Friday April 28	a) 58 Technology adoption and social networks	b) 44 Prospects and problems in social network analysis
10:40-11:00	26 - Network Effects, network structure and consumer interaction in mobile telecommunications in Europe and Asia <i>Daniel Birke</i>	29 - What is network theory? <i>Steve Borgatti, Ajay Mehra</i>
11:00-11:20	42 - A Structural Analysis of Cell Phone Attitudes and Usage Patterns <i>Marlene Burkhardt, Jesse Leonard, Thomas Kimmel, Gerald Miceli, William Russell, James Nelson, Joshua Owens, Nicholas Sefcho, Lesley Snoby, Nicholas Sefchok, Adam Black, Nicole Zinobile, Carey Lightner, Darius Reed</i>	44 - A Note on the Value of Stylized Facts in Network Analysis <i>Ron Burt</i>
11:20-11:40	157 - Reciprocity of cross- and same-sex relationships in face-to-face and text message-mediated networks <i>Tasuku Igarashi, Garry Robins, Pip Pattison, Peng Wang</i>	173 - A Paradigm Too Far? Reconsidering Social Network Analysis As Normal Science <i>Martin Kilduff, Wenpin Tsai, Ralph Hanke</i>
11:40-12:00	332 - Relationship between Online Discussion eWOM and Product Sales--A SNA Perspective <i>Jyun-Cheng Wang, Chui-Cheng Chiu</i>	232 - Issues of Emergence, Diffusion & Visualization in Dynamic Networks <i>James Moody</i>
12:20-1:40	lunch	lunch

c) 32a Network Dynamics A	d) 43 Politics and Network Structures	e) 13 Entrepreneurial Networks	Friday April 28
16 - Interpersonal Influence and the Dynamics of Polarization <i>Delia Baldassarri,</i> <i>Peter Bearman</i>	61 - How Governments Think – 1: Using networks to explain ‘innovation culture’ in different governments <i>Mark Considine,</i> <i>Jenny Lewis</i>	10 - The affiliation network of individual angel investment decisions <i>Craig Allen,</i> <i>David Bangert,</i> <i>Lenard Huff,</i> <i>Robert Robinson</i>	10:40-11:00
58 - Network Evolution: Exploring Advocacy in the European Union <i>Dimitrios Christopoulos</i>	158 - Networks of Political Donations: A Study of Interlocking Directorates <i>Lorien Jasny</i>	55 - Networks Here and There: Transnational Entrepreneurship in the Internet Era <i>Wenhong Chen</i>	11:00-11:20
179 - The Co-Evolution of Personal Networks and Communication Media Usage <i>Otto Koppius</i>	198 - How Governments Think - 2: Using networks to explain the roles of politicians and bureaucrats <i>Jenny Lewis,</i> <i>Mark Considine</i>	125 - The Role of Informal Networks among Firms and Interest Organizations in the Structuring of Emerging Organizational Communities <i>Peter Groenewegen,</i> <i>Wouter Stam</i>	11:20-11:40
312 - Multi-theoretical multilevel modeling of the co-evolution of social relations and individual performance <i>Vanina Torlò,</i> <i>Silvia Profili</i>	194 - The Tertius Ruler: A Simmelian Model of Triadic Governance <i>Zong-Rong Lee</i> Academia Sinica, Institute of Sociology, Taipei, Taiwan	352 - Networks of Cooperation and Competition in the Tokyo’s Cluster of Internet Companies <i>Kou Yukawa</i>	11:40-12:00
lunch	lunch	lunch	12:20-1:40

Friday 3

Friday April 28	a) 16 Exponential Random Graphs	b) 51 Social Capital, Social Influence and Diffusion
1:40-2:00	47 - Curved Exponential Family Parameterizations for Spatial Network Models <i>Carter Butts</i>	50 - Influence Structures in a Tongan Village <i>Charles Cappell, Giovanni Bennardo</i>
2:00-2:20	118 - Birds of a Feather, or Friend of a Friend? The Joint Effects of Homophily and Transitivity on Adolescent Social Networks <i>Steven Goodreau, James Kitts, Martina Morris</i>	76 - Learning by connecting, social capital as a learning landscape <i>Tjip De Jong, Lidewey Van Der Sluis</i>
2:20-2:40	209 - Structure, agency and culture in statistical models for social networks <i>Dean Lusher, Garry Robins</i>	212 - Linking without thinking: weblogs, readership and online social capital formation <i>Cameron Marlow</i>
2:40-3:00	258 - The co-evolution of multiple networks <i>Philippa Pattison, Garry Robins, Peng Wang, Tom Snijders, Johan Koskinen</i>	217 - Unsolicited Job Information and the Invisible Hand of Social Capital <i>Steve McDonald, Nan Lin, Dan Ao</i>
3:00-3:20	275 - New specifications for exponential random graph (p*) models for directed networks <i>Garry Robins, Pip Pattison, Peng Wang</i>	240 - Social Capital and Innovation: Examining small to medium size firms in Spain <i>Sanjeev Nath, Luis Arturo Rabade</i>
3:20-3:40	coffee	coffee

c) 1 2-Mode Networks	d) 39b On-Line Communities B	e) 57 Status, Wealth, Power and Control	Friday April 28
21 - Identifying dense subnetworks in large two-mode networks <i>Vladimir Batagelj, Andrej Mrvar</i>	138 - Linguistic Diversity and Language Networks on Live-Journal <i>Susan Herring, Benjamin Clark, Inna Kouper, John Paolillo, Irene Ramos-Vielba, Lois Ann Scheidt, Sharon Stoerger, Elijah Wright</i>	78 - Doing Gender in Networks; Power at Work <i>David Dekker, Yvonne Benschop</i>	1:40-2:00
237 - Analytical challenges with a dense, longitudinal venture capital network <i>Stephen Muth, Carolyn Birmingham</i>	141 - Why Do Some Open Source Software Projects Succeed While Others Fail? Group Centrality Constructs As Predictors Of Project Outcome <i>David Hinds, Ronald M. Lee</i>	109 - Social Networks and Health Delivery in Rural Bangladesh <i>Kaberi Gayen, Robert Raeside</i>	2:00-2:20
246 - Two-Mode vs. One- Mode: Ranking Differences and Social Interpretation <i>Katharina Oberbichler, Jürgen Pfeffer, Harald Katzmaier</i>	254 - Social Network and Genre Emergence in Amateur Flash Multimedia <i>John Paolillo, Jonathan Warren</i>	213 - The Network Structure of Status Evaluations <i>Peter V Marsden, Freda B Lynn</i>	2:20-2:40
290 - Methods for analysis of multi-mode medical data <i>Andrew Seary, Bill Richards</i>	289 - Teaching Swarm Creativity through Social Network Analysis <i>Detlef Schoder, Maria Paasivaara, Peter Gloor</i>	299 - Social Capital and Subjective Status: Evidence from China and the US <i>Lijun Song</i>	2:40-3:00
	343 - WoW!: The dynamics of knowledge networks in Massively Multiplayer Online Role Playing Games (MMORPG) <i>Bethany Wotal, Harold Green, Dmitri Williams, Noshir Contractor</i>	265 - Evolution of Portfolios of Exchange Relationships: Patterns of Competition and Cooperation <i>Uladzimir Radkevitch, Eric van Heck, Otto Koppius</i>	3:00-3:20
coffee	coffee	coffee	3:20-3:40

Friday 4

Visible Path
Award Talk
Nathaniel Bulkley
5:00 - 6:00

Italy Opera Buffet
has moved
to Singapore

Silk Road Trio

Singapore Buffet
7:00 - 9:00

Café Pacifica
at the
Pan Pacific Hotel

Friday April 28	a) 47 Semantic Network Analysis	b) 4a Algorithms and Analytic Methods A
3:40-4:00	80 - Evaluating Scientific Classification Systems by Bottom-Up Clustering of Abstracts Using Semantic Network Analysis <i>Jana Diesner, Jürgen Pfeffer, Harald Katzmaier</i>	22 - Three Dimensional Blockmodeling <i>Vladimir Batagelj, Patrick Doreian, Anuska Ferligoj</i>
4:00-4:20	121 - What comes into your mind if you think of food quality: Concept Mapping in Consumer Behaviour Research <i>Carola Grebitus, Maike Bruhn</i>	34 - Computing Continuous Core/Periphery Structures for Social Relations Data Using MINRES SVD <i>John Boyd, William Fitzgerald, Matthew Mahutga, David Smith</i>
4:20-4:40	277 - Methodological Advancements for the Measurement and Visualization of Chat-Based Computer-Mediated Communication Networks <i>Devan Rosen</i>	311 - Networks of Propositions: Applying the Robertson-Seymour Results to a Problem in the Social Sciences: Weakening Support for the Davis-Moore Hypothesis <i>Geoffrey Tootell, Amy Vu</i>
4:40-5:00		

c) 60b Visualization B	d) 25b Intra-Organizational Networks B	e) 17 Friendship networks	Friday April 28
35 - Visualization of Affiliation Dynamics <i>Ulrik Brandes, Martin Hoefer, Christian Pich</i>	25 - Social Network Analysis for Knowledge Management: An Organizational Case Study <i>Elisa Bienenstock, Michael Haxton, Elizabeth Warner</i>	298 - Correlates of Social Isolation: Data from the 2004 GSS Network Module <i>Lynn Smith-Lovin, Miller McPherson</i>	3:40-4:00
60 - Network Mapping as a Diagnostic Tool: Adapting and applying SNA to the needs of rural development projects in Bolivia <i>Louise Clark, Nigel Poole</i>	66 - Social network analysis to support business community management <i>Mariano Corso, Andrea Giacobbe, Giuseppe Sardone</i>	345 - Re-visit Reference Group Theory and the Contrast and Assimilation Effect of the Big-Fish- Little-Pond <i>Ming-yi Chang, Chyi-in Wu, Yu-ting Huang</i>	4:00-4:20
260 - Improving Interactive Exploration of Social Networks: A Rank-by-Feature Approach <i>Adam Perer, Ben Shneiderman</i>	244 - Creating and Shaping Social Networks in Organizations <i>Dan Novak</i>		4:20-4:40
			4:40-5:00

Saturday 1

Saturday April 29	a) 55 High Techification of Social Networks	b) 2 Academic Scientific Networks A
8:40-9:00	<p>In this roundtable session, we will discuss the varying ways in which social networks are being employed in new technologies. We will look at where and when they align with the work done by academic researchers.</p> <p>Not All Networks Are Equal: Friendship" Performance in Articulated Networks on Friendster and MySpace <i>danah boyd</i></p>	<p>134 - Modeling the SOcNET listserv: Its Structure and Operation <i>Michael Harrison, Susanta Tewari, Scott Feld</i></p>
9:00-9:20	<p>Our Lives, Our Facebooks <i>Fred Stutzman</i></p>	<p>142 - Co-authorship Network Structures and Successful Academic Publishing <i>Julie M. Hite, Steven J. Hite, Anne Rumsey-Wairepo</i></p>
9:20-9:40	<p>You are Who you Know <i>Orkut Buyukkokten</i></p> <p>Will Social Networks Transform the Business Enterprise? <i>Antony Brydon</i></p>	<p>214 - On the way to Nobel prize: What does the relational structure of laureates' scientific collaborations look like? <i>Daniele Mascia, Francesca Pallotti</i></p>
9:40-10:00		<p>224 - How Do Networkers Network? <i>Ines Mergel, Timothy Huerta, Jennifer van Stelle</i></p>
10:00-10:20		<p>350 - Making Invisible Colleges Visible - AI Researchers' Network Positions and Productivity <i>Yuki Yasuda, Yutaka Matsuo</i></p>
10:20-10:40	coffee	coffee

c) 46 Sampling methods	d) 37a Networks, Collective Action and Social Movements A	e) 52 Social Capital.	Saturday April 29
69 - The effect of sampling on the structure of an international airport network <i>Elizabeth Costenbader, Georgiy Bobashev, Robert J. Morris</i>	2 - An Approach for Studying Online Networks of Nanotechnology- Opponents <i>Robert Ackland, Bruce Bimber, Rachel Gibson, Mathieu O'Neil</i>	40 - Social Capital Networks, Relational Schema and the Macro-Distribution of Power: The Japanese "Butterfly State" in U.S. and German Comparison <i>Jeffrey Broadbent</i>	8:40-9:00
97 - Combining cluster sampling and link-tracing sampling to estimate population totals of socially networked populations <i>Martin Felix-Medina, Pedro Monjardin</i>	245 - The Emergence of Nanotechnology- Opponents in Online Environmental Networks <i>Mathieu O'Neil, Robert Ackland</i>	74 - Web Capital: A Network Approach <i>James Danowski</i>	9:00-9:20
113 - Model-based Assessment of the Impact of Missing Data on Inference for Networks <i>Krista Gile, Mark Handcock</i>	196 - Embedded networks and the growth of voluntary associations: Packing a Wallop <i>Thomas M. Lento, Howard T. Welsler, Marc A. Smith, Lei Gu</i>	92 - Social capital across contexts: strategies for theory and research <i>Bonnie Erickson</i>	9:20-9:40
309 - Flexible link-tracing sampling designs for networked populations <i>Steven Thompson</i>	205 - Movement-Counter movement Interaction: Dynamic and Structural Modeling of Participation <i>Benjamin Lind</i>	148 - Position Generators, Affiliations, and the Institutional Logics of Social Capital: A Study of Taiwan Firms and Individuals <i>Ray-May Hsung, Ronald L. Breiger</i>	9:40-10:00
348 - Sampling from hard-to-reach populations in graphs <i>hong xu</i>	230 - What are they really talking about? <i>Pierre Mongeau, Johanne Saint-Charles, Frédéric Mertens, Donna Mergler</i>	322 - The contributions of individuals to social capital: The role of values and friendship <i>Harry Van Buren</i>	10:00-10:20
coffee	coffee	coffee	10:20-10:40

Saturday 2

Saturday April 29	a) 34 Networks and Emotions	b) 4b Algorithms and Analytic Methods B
10:40-11:00	15 - Energy Networks <i>Wayne Baker</i>	75 - Fuzzy, Overlapping Groups in the Enron Email Corpus <i>George Davis, Edo Airoidi, Kathleen Carley</i>
11:00-11:20	36 - Through a Flawed Lens: Explaining Tie Formation Through Affective Meanings <i>Matthew Brashears, Laura Auf der Heide</i>	170 - Determining Networks as Opportunity Landscapes - From EGO-Networks to Egocentric Network Profiles <i>Harald Katzmair, Doris Spielthener, Jürgen Pfeffer</i>
11:20-11:40	43 - Emotional Activity around Structural Holes <i>Ron Burt</i>	193 - Identifying Leaders using Email Transaction in an Organization Network <i>Sin Yeung Lee</i>
11:40-12:00	51 - Social Identity, Social Networks, and Conflict <i>Inga Carboni</i>	286 - Methods for the identification of community structures in social networks <i>Giuseppe Sardone, Fabio Riggi</i>
12:20-1:40	lunch	lunch

c) 50 Small World Research	d) 12 Criminals, Gangs, Terrorists, and Networks	e) 45a Qualitative Approaches A	Saturday April 29
9 - Personal network size and variance: Evidence from a position generator <i>Malcolm Alexander, Ralph Matthews</i>	234- Vulnerability and Disruption in Criminal Networks: A Case Study <i>Carlo Morselli</i>	82 - Qualitative Network Science <i>Silvia Domínguez, Michael Francis Johnston</i>	10:40-11:00
119 - On Measurement, Moreno and Milgram: Thinking about the Foundations of Network Science <i>Nicholas Gould</i>	238 - Testing Balance Theory: Examination of Gang Networks of Rivals and Allies <i>Kiminori Nakamura, George Tita, David Krackhardt</i>	146 - Networks, Actors, and Meaning. Contributions of Qualitative Research to the Study of Social Networks <i>Betina Hollstein</i>	11:00-11:20
171 - The Fortune Global 500: A Very Big Small World <i>Jeffrey Kentor, Yong Suk Jang</i>	276 - Looking for the power in “secret” terrorist networks <i>Josep Rodriguez, Pau Mari, Anna Ramon</i>	218 - Footings, Frames, and Relations: The Interpretive Origins of Networks <i>Daniel McFarland</i>	11:20-11:40
174 - The accuracy of small world chains in social networks <i>Peter Killworth, Christopher McCarty, Russ Bernard</i>	314 - On Effectiveness of Wiretap Programs at Mapping Dynamic Covert Networks <i>Maksim Tsvetovat, Kathleen M. Carley</i>		11:40-12:00
lunch	lunch	lunch	12:20-1:40

Saturday 3

Saturday April 29	a) 3 Network Theory	b) 42 Political Networks
1:40-2:00	38 - A plea for consistent terminology for personal and social networks <i>Devon Brewer</i>	200 - Before and After the Exchange of Ruling Elites: Informal Political Networks in Germany's Parliament <i>Klaus Liepelt, Haiko Lietz</i>
2:00-2:20	162 - Comparative Network Analysis and the Development of Network Theory <i>Jeffrey Johnson</i>	220 - Governing the Policy Web <i>Kathleen McNutt</i>
2:20-2:40	203 - Automatic Modeling of Social Networks through Content Analysis of Communications <i>Ching-Yung Lin, Xiaodan Song, Ming-Ting Sun, Belle Tseng</i>	272 - The Hungarian Transportation Network: Using Network Analysis to Quantify Accountability and Transparency on the M6 Highway <i>David Regeczi</i>
2:40-3:00		274 - The Plame Game <i>Jessie Riposo, Sara Citrenbaum, Maksim Tsvetovat</i>
3:00-3:20		296 - Ideology Vs. Party: Multidimensional Models of Political Support in the US Senate <i>John Skvoretz</i>
3:20-3:40	coffee	coffee

c) 5 Centrality Measures in Social Networks	d) 20 Innovations	e) 54 Social Support	Saturday April 29
23 - The spatial structure of large-scale networks of social relations and communication <i>Dominik Batorski, Pawel Kucharski</i>	53 - Specialization and brokerage: Technological knowledge growth as a network of patented ideas, 1975-1999 <i>Gianluca Carnabuci, Jeroen Bruggeman</i>	191 - The Burden of Social Network and Depressive Symptoms <i>Rance P.L. Lee, Ying-keung Chan</i>	1:40-2:00
114 - Two New Local Measures of Relative Degree <i>Eric Gleave, Howard Welser, Danyel Fisher, Marc Smith</i>	128 - Communication Structure and Productivity of Open Source Software Projects <i>Yutaka Hamaoka</i>	239 - Local Currency and Social Support Networks <i>Hiromi Nakazato, Takeshi Hiramoto</i>	2:00-2:20
241 - Comparative effects of different centrality measures in dynamic networks <i>Kah Loon Ng, Nina Fefferman</i>	149 - Social Capital and Innovation at Work <i>Ray-May Hsung</i>	248 - Informational Resources for Cancer Survivors: Which Institutions Count? <i>Mark Pachucki</i>	2:20-2:40
288 - Political capital vs. Centrality in the Mexican network of power <i>Samuel Schmidt, Jorge Gil-Mendieta</i>	210 - The Structures of Conceptual Change <i>Terri Mackeigan, Stephen Q. Muth</i>	279 - Struggling but not alone: Social networks of children heads of households in Namibia <i>Monica Ruiz-Casares</i>	2:40-3:00
317 - Entropy as a Measure of Centrality in Networks Characterized by Path-Transfer Flow <i>Frank Tutzauer</i>	293 - The Integrative Study of co-inventor and co-author networks: an Application of Social Network Analysis into Innovation <i>Naohiro Shichijo, Satoko Asai, Kazuhito Fukuchi, Yasunori Baba</i>	329 - A Study of the Social Support Networks of Cancer Patients <i>Patricia A. Wakefield</i>	3:00-3:20
coffee	coffee	coffee	3:20-3:40

Saturday 4

Saturday April 29	a) 27 Mathematical Models	b) 29 Statistical Methods
3:40-4:00	94 - Why are networks the shape they are? Part 2 The Simulation. <i>Martin Everett,</i> <i>Steve Borgatti</i>	353 - Multiple networks: Comparing QAP and exponential random graph (p*) models <i>Yu Zhao,</i> <i>Garry Robins</i>
4:00-4:20	108 - A Nonlinear Model of Political Decision Making in Small Groups <i>Michael Gabbay</i>	56 - Tight and loose clustering: measuring structural tendency toward triangles or diamonds <i>Yen-Sheng Chiang,</i> <i>Katherine Stovel,</i> <i>Christine Fountain</i>
4:20-4:40	291 - Evaluating Social Influence Relations:an Item- Response-Modeling Approach <i>Gero Schwenk</i>	324 - p2 model fit and diagnostics <i>Marijtje Van Duijn,</i> <i>Bonne Zijlstra</i>
5:40-5:00	302 - Actor-driven alternatives to exponential random graph models <i>Christian Steglich</i>	62` - Cascade Dynamics of Complex Propagation <i>Damon Centola</i>
5:20-5:40		

c) 32b Network Dynamics B	d) 25c Intra-Organizational Networks C	e) 45b Qualitative Approaches B	Saturday April 29
48 - Global dynamic effects of manipulation and annihilation of well-connected hubs <i>Dragos Calitoiu, Zachary Jacobson</i>	136 - The Link between Interaction and Learning <i>Jens Hemphälä</i>	4 - When Ties are non-Ties and Non-Ties are Ties: Allowing Emergent Definitions in Network Data Collection Instruments <i>jimi adams</i>	3:40-4:00
166 - The Third Entity in the Dyad: the relationship. Exploration of reciprocal and non-reciprocal relationships <i>Diana Jones</i>	160 - Team network performance <i>Jan-Erik Johanson</i>	46 - Misrecognition or Misapplication: Are Social Networks Always Social Capital? <i>Sarah Busse Spencer</i>	4:00-4:20
301 - Positional Analysis of Process Data: The Moving Structure Approach <i>Christian Stegbauer, Alexander Rausch</i>	202 - Department Networks and Teacher Development: Implications for Leadership Roles in Schools <i>Jorge Lima</i>	123 - TELEWORK: Can technology support social relations? <i>Arent Greve, Janet Salaff, Dimitrina Dimitrova</i>	4:20-4:40
326 - Network Evolution, Regional Embeddedness, and Investment Performance in the Venture Investment Arena <i>Jennifer van Stelle</i>	221 - Self-Monitoring and Social Network Centrality: A Longitudinal Investigation <i>Ajay Mehra, Alex Lopes, Ted Dass, Bipin Prabhakar</i>	297 - A Question of Access or Mobilization? Understanding Inefficacious Job Referral Networks among the Black Poor <i>Sandra Smith</i>	4:40-5:00
			5:20-5:40

Sunday 1

Sunday April 30	a) 38 Networks, Economics, and Marketsb)	b) 35 Networks and Science
8:40-9:00	30 - How social networks influence location decisions of firms <i>Johannes Boshuizen, Anne Van der Veen</i>	19 - Public, Private, and Secret Faces of Influential Nuclear Networks <i>Robert Anderson</i>
9:00-9:20	101 - Networks in the New Economy: Labor Market Institutions and the Job Matching Process <i>Christine Fountain</i>	180 - Construction and analysis of bibliographic networks <i>Simona Korenjak-Černe, Vladimir Batagelj, Matjaž Zaveršnik, Nataša Kejžar</i>
9:20-9:40	306 - Hearing About A Job: Networks, Information, and Segregation in Labor Markets <i>Katherine Stovel, Christine Fountain, Anshuman Shukla University of Washington, Sociology, Seattle, WA, USA</i>	235 - Perceptions of the Research Environment: Examining the Role of Researchers' Networks <i>Jonathon Mote, Yuko Whitestone, Jerald Hage, Gretchen Jordan</i>
9:40-10:00	225 - Lobbies Europeanly Institutionalized: European Social Dialog with the Organized Civil Society. The European Economic and Social Committee (EESC). <i>Fredesvinda Merida</i>	57 - Science for science's sake: Informal scientific networks and their resilience to social engineering <i>Andrew Parker, Diana Rhoten</i>
10:00-10:20	266 - Social Network, Cohort Influence and Employability <i>Robert Raeside, Kaberi Gayen, Ronald McQuaid</i>	344 - Co-investigator Networks among and within National Science Foundation Directorates <i>Elijah Wright</i>
10:20-10:40	coffee	coffee

c) 22 UInterlocking Directorates	d) 37b Networks, Collective Action and Social Movements B	e) 15 Exchange Networks / Game Theory	Sunday April30
28 - The structure of the British intercorporate network and its political and social consequences. <i>Matthew Bond</i>	39 - Pathways to Participation: Network Resources and NGO Participation in Japanese Climate-Change Policy Formation <i>Jeffrey Broadbent, Yutaka Tsujinaka, Stephanie Devitt</i>		8:40-9:00
63 - Sarbanes-Oxley, board Structure and the corporate board network <i>Jacqueline Cook</i>	79 - Interests, identities, and relations in civic organizational fields <i>Mario Diani, Katia Pilati</i>	67 - Conventions and information in dynamic networks: An experimental study <i>Rense Corten</i>	9:00-9:20
87 - Unintended structural consequences in the recruitment of female directors <i>Christofer Edling, Love Bohman</i>	83 - Battling Networks of Rival Environmental Social Movements <i>Patrick Doreian, Jared Coopersmith</i>	159 - Measuring the sustainability of virtual community of help by utilizing social network analysis <i>Sunny Jeong</i>	9:20-9:40
133 - Analysing very-large networks of political and business elites <i>Nicholas Harrigan</i>	256 - Dynamics and Tensions in American Environmentalism: Organizations, Ideologies, and Events, 1970-2001 <i>Hyung Sam Park</i>	287 - The Effects of Resource Variation on Power, Diversity, and Trust in Exchange Networks <i>David Schaefer</i>	9:40-10:00
263 - Interlocking Directorate and Corporate Performance in the United Kingdom: Social Network Analysis of Director Interlocks on Layers of Different Profitability <i>Vladimir Popov</i>	310 - Network Diversity and Social Movement Identification <i>David Tindall, Joanna Robinson</i>		10:00-10:20
coffee	coffee	coffee	10:20-10:40

Sunday 2

Sunday April30	a) 2 Academic Scientific Networks B	b) 49 Simulation
10:40-11:00	65 - Redundancy of practice and network integration in scientific labs. <i>Raffaele Corrado, Alessandro Narduzzo, Matteo Prato</i>	85 - Socio-Dynamic Discrete Choice on Networks: Sample Size, Initial Conditions, Geographic Scale, Systematic Omitted Links, and Availability of Alternatives <i>Elenna Dugundji, Laszlo Gulyas</i>
11:00-11:20	112 - The Mexican scientific structure: the scientists networks, institutions and related countries <i>Jorge Gil-Mendieta, Alejandro Ruiz</i>	105 - The Tragedy of the Network <i>Allan Friedman</i>
11:20-11:40	126 - Social Network Effects in an Emerging Research Community <i>Peter Groenewegen, Peter Mika, Tom Elfring</i>	127 - Incorporating Social Networks into Travel Behavior Analysis <i>Jeremy Hackney, Andreas Frei, Timo Ohnmacht, Kay Axhausen</i>
11:40-12:00	178 - Advice Seeking in a Scholarly Network: Interacting Effects of Homophily and Structural Similarity <i>Emmanuel Koku, Jeffrey Boase, John Horrigan, Lee Rainie</i>	262 - Micro Behavior and Macro Structure in Context by Means of Agent Based Simulation <i>Jürgen Pfeffer, Harald Katzmaier</i>

c) 23 International Networks	d) 8 Communication Networks	e) 56 Statistical Network Models	Sunday April30
18 - A Network Analysis of International Aid Flows <i>George Barnett, Yon Soo Lim, Jang Hyun Kim</i>	88 - Informal Networks in Global Software Development Teams <i>Kate Ehrlich, Klarissa Chang</i>	3 - Implication Structures and Household Artifacts: Analyzing the Changing Patterns of Ownership and Possession in the American Home, 1980-2003 <i>Ryan Acton, Carter Butts</i>	10:40-11:00
168 - Global Structure of Film Flows: Mapping World Film Trade Between 1996 and 2004 <i>Seung Joon Jun, George Barnett, Heasun Chun</i>	130 - Media Use and Personal Support Networks: A Longitudinal Study <i>Keith Hampton</i>	103 - Social Network Data, Given Error: Evidence for the Construction of Confidence Intervals Around Network Measures <i>Terrill Frantz, Marcelo Cataldo, Kathleen Carley</i>	11:00-11:20
182 - Networks and Safety Nets: Financial Openness, Trade Relations, and the Welfare State <i>Ferry Koster</i>	251 - Multilevel Modeling of Retrieval Behaviors in Transactive Memory Networks <i>Edward T. Palazzolo, Roger T. A. J. Leenders, Noshir S. Contractor</i>	267 - Model-based clustering for social networks <i>Adrian Raftery, Mark Handcock, Jeremy Tantrum</i>	11:20-11:40
192 - The Emergence of Clusters in Global Telecommunications Network <i>Seungyoon Lee, Peter Monge, Francois Bar</i>	270 - How to reveal the Informal Structure of Organisations <i>Alexander Rausch, Christian Stegbauer, Steven T. Blythe</i>	284 - How many people do you know in prison?: Using overdispersion in count data to estimate social structure in networks <i>Matthew Salganik, Tian Zheng, Andrew Gelman</i>	11:40-12:00



Workshops

1. Introduction to the Analysis of Network Data via UCINET and NetDraw

Stephen Borgatti
Boston College, Massachusetts USA

Martin Everett
University of Westminster, UK

A beginners tutorial on the concepts, methods and data analysis techniques of social network analysis. The course begins with a general introduction to the distinct goals and perspectives of network analysis, followed by a practical discussion of network data, covering issues of collection, validity, visualization, and mathematical/computer representation. We then take up the methods of detection and description of structural properties such as centrality, cohesion, subgroups, cores, roles, etc. Finally, we consider how to frame and test network hypotheses. An important element of this workshop is that all participants are given a demonstration version of UCINET 6 for Windows and the Netmap visualization software, which we use to provide hands-on experience analyzing real data using the techniques covered in the workshop. In order to participate fully in the workshop, participants should bring laptop computers so that they can run the analyses on their machines at the same time as they are being demonstrated by the instructors.

Tuesday, April 25, 1:00pm - 5:00pm and
Wednesday, April 26, 9:00am - noon

Cost: Students \$50, all others \$100

2. Pajek workshop: Analysis of Large Networks

Vladimir Batagelj
University of Ljubljana, Slovenia

Andrej Mrvar
University of Ljubljana, Slovenia

Pajek is a program for Windows for analysis and visualization of large networks. It is free for noncommercial applications and can be downloaded from its home page. To actively follow the workshop participants are expected to bring their laptops.

2a - First part: (Tuesday afternoon) Introduction to Pajek. In the first part we will give an introduction to the use of Pajek based on our textbook on social network analysis 'Exploratory Social Network Analysis with Pajek'. Jurgen Pfeffer, from FAS.research, Vienna will present his program Text2Pajek that converts excel/text file datasets into Pajek format.

2b - Second part: (Wednesday morning) Advanced uses of Pajek. In the second part we will present some efficient approaches (valued cores, triangular and short cycle connectivity, citation weights, pattern search, generalized blockmodeling, islands) to analysis and visualization of real-life large networks. We will also demonstrate some newest additions to Pajek: network multiplication and kinship relations, (p,q)-cores and 4-rings weights in analysis of two-mode networks, matrix display of dense networks, linking network visualizations to Internet.

Part one: Tuesday, April 25, 1:00pm - 5:00pm

Cost of each part: Students \$25, all others \$50

Part two: Wednesday, April 26, 9:00am - noon

3. SocioMetrica Suite: EgoNet, LinkAlyzer, Visualyzer

Allen Tien
Medical Decision Logic, Inc.

Chris McCarty
University of Florida

Emmanuel Koku

Paul Broome
Medical Decision Logic, Inc.

This workshop will focus on our SocioMetrica Suite: EgoNet (personal network data collection), LinkAlyzer (linking personal network data), and Visualyzer (visualization and logical reasoning about graphs) software applications. Attendees will get a free copy of the software applications.

SocioMetrica Suite Part 1: Overview of EgoNet, LinkAlyzer, Visualyzer, focus on EgoNet

SocioMetrica Suite Part 2: Focus on Visualyzer and logical reasoning

3a: Tuesday, April 25, 1:00pm - 5:00pm

Cost of each part: Students \$30, all others \$50

3b: Wednesday, April 26, 9:00am - noon

Cost of both parts: Students \$50, all others \$85

4. Exponential random graph (ERG or p*) models

Garry Robins
University of Melbourne

Pip Pattison
University of Melbourne

Dave Hunter
Penn State University

Mark S. Handcock
University of Washington

Carter Butts
UC Irvine

Steve Goodreau
University of Washington

This workshop describes exponential random graph models for social networks, and outlines important new developments in model specification and in software for fitting these models to empirical data. The workshop comprises two sessions, but participants are free to attend one or both sessions (although those unfamiliar with this class of models are advised to attend the methodology tutorial before the statnet introduction).

4a - Session 1 (Tuesday afternoon): An introduction to ERG models and to new model specifications. (Pattison, Robins, Handcock)

We present a tutorial introduction to exponential random graph models, describe the commonly used but problematic class of Markov random graphs, and outline new specifications that make ERG models a much more practical and useful tool for the statistical analysis of social networks. In particular, we introduce the three new model specifications of Snijders, Pattison, Robins and Handcock (2005) - geometrically weighted degree distributions; alternating k-triangles; and alternating independent two-paths - and explain why they are a dramatic improvement for the modeling of many observed data sets. We briefly describe Monte Carlo maximum likelihood techniques for fitting these models, illustrate how to fit social network ties and individual attributes simultaneously, and discuss goodness of fit and simulation. Parameter interpretation is discussed. We briefly introduce publicly available software packages, statnet and StOCNET, that can estimate parameters. Participants will be provided with advance copies of papers on the new specifications intended for publication in a special edition of Social Networks.

4b - Session 2 (Wednesday morning): Introduction to statnet: an R-based program for statistical analysis and simulation of social networks. (Handcock, Hunter, Butts, Goodreau)

This workshop will provide a hands-on tutorial to statnet, a statistical package for the visualization, analysis and simulation of social network data. The modeling capabilities of statnet include the class of exponential random graph (ERG) models. These models recognize the complex dependencies within relational data structures, and provide a very flexible framework for representing them. Examples include degree distributions and stars, attribute-based mixing patterns, triadic patterns that lead to clustering, shared partner distributions, the new specifications in Snijders et.

Al. 2005, and other systematic network configurations. statnet has a coherent and flexible user interface and can handle relatively large networks (~3,000 is the largest network we have estimated models for), and it has very efficient algorithms for data manipulation and analysis. The package provides tools for both model estimation and model-based network simulation, with visualization, tools for inference and validation, and goodness of fit diagnostics. The package is written for the R statistical computing environment, so it runs on any computing platform that supports R (Windows, Unix/Linux, Mac), it is freely available through the Comprehensive R Archive Network (CRAN), and it has a seamless interface to SNA (an R package for traditional network analysis written by Carter Butts). This workshop is designed to follow on the Tuesday workshop "Introduction to ERGMs", but it can also be taken independently.

4a - Tuesday, April 25, 1:00pm - 5:00pm

Cost of each part: Students \$30, all others \$50

4b - Wednesday, April 26, 9:00am - noon

Cost of both parts: Students \$50, all others \$85

5. MultiNet

Andrew Seary
Simon Fraser University, Canada

Bill Richards
Simon Fraser University, Canada

MultiNet is an interactive computer program for the analysis and display of discrete and continuous network data. It simultaneously examines characteristics of links and nodes. The program is menu-driven, it has context-sensitive, interactive, on-line help, and always presents a color graphic representation of the data or the results of analysis as well as a textual report. The program does univariate descriptive statistics, crosstabulation, analysis of variance, regression, correlation, p^* , and eigen analysis. It has powerful and flexible data manipulation capabilities. It performs continuous and discrete transformations, such as ordination, quantiles, recategorization; linear, log, power, and z transforms. New variables can be created by transforming or combining existing ones in any manner describable by algebraic equations. The program also provides file viewing and editing.

Part 1. Managing complex data

MultiNet is a program designed for exploring many types of relationships in complex network data. We discuss the univariate and multivariate methods currently available for exploring both attribute (node) and network (link) variables. These include discrete and continuous data recoding and bivariate and trivariate methods applied to node and link variables by themselves, as well as within networks. These methods will be demonstrated on real network data.

Part 2. Spectral Analysis

MultiNet does four types of eigen decomposition for spectral analysis of networks with up to 5,000 nodes with interactive graphical display of results in 1, 2, or 3 dimensions. We will demonstrate the analytic procedure; explain the various options available for interactive display of results; and show how the results from this procedure are integrated with the rest of the program and how both coordinates in eigen space and partitions can be used as variables in any other subsequent analysis.

Part 3. Hybrid methods

We describe hybrid methods which allow creating node variables from networks, such as eigenvectors, partitions, and various centrality measures. We also describe methods for creating link variables from node attributes, and groupings of link variables. These methods will be demonstrated on real network data.

Part 4. p^* in MultiNet

We describe the implementation of p^* in Multi-Net, and discuss various aspects of p^* fitting with special types of data: large; symmetric; bipartite; multiple network. Since the current version can handle up to 5,000 nodes and 256 parameters, managing the displays and reports can be quite complex. We demonstrate how this implementation may be applied to some moderately large datasets.

Part 5. MultiNet in action

We apply topics covered in the preceding parts to analyse moderately large, complex datasets from medicine. Topics applied include eigen-spaces, hybrid data creation and recoding, bipartite p^* fitting, and network crosstabs.

Tuesday, April 25th 1:00pm - 5:00pm

Cost: Students \$30, all others \$50

6. Networks for Newbies

Barry Wellman

University of Toronto, Canada

This is a non-technical introduction to social network analysis. It describes the development for social network analysis, some key concepts, and some key substantive methods and findings. It is aimed at newcomers to the field, and those who have only seen social network analysis as a method.

Wednesday, April 26th 8:30am - noon

Cost: Students \$30, all others \$50

7. SIENA

Christian Steglich

University of Groningen

Mark Huisman

University of Groningen

This workshop is about stochastic modelling of the dynamics of complete networks, and possible co-evolving node variables. Longitudinal network data as understood in this workshop are two or more repeated observations of a directed graph on a given node set (usually between 30 and 100 nodes, sometimes up to a few hundreds).

The workshop teaches the analysis of such data as described by Snijders (2005) and Snijders, Steglich & Schweinberger (2006), which is implemented in the SIENA program. The stochastic model of the network evolution process allows for inclusion of various endogenous network effects (reciprocity, transitivity, cycles, popularity, etc.), effects of node-level covariates (i.e., connected to the sender, the receiver, or the similarity between sender and receiver), and of dyad-level covariates. Co-evolving node-level variables can both affect network evolution (by way of the node-level effects described above) and be affected by network evolution (via effects of network position on the node variable), resulting in a complex dynamic system.

Formally, the model is a continuous-time Markov process. A more substantive interpretation is in terms of an actor-driven (or agent-based) model, where the nodes are actors whose individual choices determine the total evolution process. More information about model and method can be found at the SIENA website (see below). The statistical analysis as implemented in the SIENA software is based on Monte Carlo simulations of the evolution model and therefore can be a bit time-consuming. The SIENA program is included in the StOCNET software package, which runs under Windows.

The workshop will focus on the intuitive understanding of the model and operation of the software, making use of some examples on data sets provided with the software. Also, the meta-analysis of multiple evolution processes will be demonstrated, as suitable for data that have a multilevel structure (e.g., longitudinal data on multiple school class networks).

Participants are requested to check the SIENA website in the week before the workshop to download the workshop materials. For optimal benefit, it is advisable to bring an own laptop with StOCNET already installed, such that some steps of data manipulation can be followed hands-on.

Reading material:

Tom A.B. Snijders (2005). Models for Longitudinal Network Data. Chapter 11 in P. Carrington, J. Scott, & S. Wasserman (Eds.), *Models and methods in social network analysis*. New York: Cambridge University Press.

Tom A.B. Snijders, Christian E.G. Steglich, and Michael Schweinberger (2006). Modeling the co-evolution of networks and behavior. To appear in *Longitudinal models in the behavioral and related sciences*, edited by Kees van Montfort, Han Oud and Albert Satorra; Mahwah NJ: Lawrence Erlbaum.

Both papers can be downloaded at

<http://stat.gamma.rug.nl/snijders/publ.htm>.

Tuesday, April 25th 1:00pm - 5:00pm

Cost: Students \$35, all others \$50

8. Social Network Approaches for Behavior Change

Tom Valente

Director, Master of Public Health Program

Department of Preventive Medicine

School of Medicine

University of Southern California

This workshop will be conducted in 2 sections. Section 1 will review existing evidence for the utility of using social network data for behavior change in a variety of settings including health behaviors and organizational performance. We present a typology of such efforts. Section 2 will demonstrate existing software programs for implementing social network interventions. The workshop will be conducted by Tom Valente who has developing and implementing network based interventions for over 10 years.

Wednesday, April 26th 8:30am - noon

Cost: Students \$25, all others \$35



Wednesday Afternoon Part One

W3: Collecting Network Data A

Entity Resolution in Social Networks

Lise Getoor and Indrajit Bhattacharya
University of Maryland
Computer Science Department
College Park, MD USA

More and more, social network analysis is being applied to large data collections, originally collected for other purposes, and potentially combined from multiple sources. Because of this, the data may be noisy, inaccurate and actor references may be inexact (e.g., a 'John Smith' and 'J. Smith' may refer to the same underlying individual and two 'J. Smith's may refer to distinct individuals). Entity resolution in social networks is the problem of reconciling data references corresponding to the same real world entity. The goal is to reconstruct a 'cleaned' social network that accurately captures the actual relationships among the true underlying entities. This is an important first step in any social network analysis process; mining an unresolved network will be inefficient and result in inaccurate conclusions. The novel aspect of our work is that we exploit both the attributes of the actors and their relationships to aid in the resolution process. This results in a iterative algorithm that resolves references collectively, rather than on a pairwise basis. We demonstrate our algorithms on several data sets, including a large co-authorship network.

Deconstructing the tie: behavioral and self-report measures of relationships

David Lazer
Harvard University, Kennedy School of Government,
Cambridge, MA USA
Nathan Eagle and Alex (Sandy) Pentland
Media Lab MIT
Cambridge, MA USA

The foundational element of network analysis is the dyadic relationship. To date, the large majority of social

network studies have relied on self-report data. However, in recent years behavioral measures—based on e-mails, phone logs, physical proximity, etc—have emerged as an alternative tool for measuring social interactions and thus relationships. Further, we anticipate that behavioral measures will become increasingly common because of the constantly recorded traces of our relationships. The increasing use of behavioral measures highlights critical questions regarding exactly what a “relationship” is, and what is the conceptual relationship between behavioral and self-report measures of that construct. These issues include but go well beyond the challenges of “informant accuracy” (a la the Bernard-Killworth-Sailer studies). We propose a five stage process relating behaviors to cognition to self-reporting of relationships. We illustrate these ideas with two data sets.

A Database Perspective of Social Network Analysis

Mauro San Martín
Universidad de Chile,
Departamento de Ciencias de la Computación
Santiago, Chile
Miguel Aguirre Perry
1873, La Serena, IV Región -- Chile
Claudio Gutierrez
Universidad de Chile,
Departamento de Ciencias de la Computación
Santiago, Chile

Data Processing Interest in social networks is becoming pervasive and data volumes increase dramatically; however, current tools and models for data storage and manipulation in the area still lack established methodologies of the field of databases. For instance, there are no standard storage formats promoting reuse, sharing or combination of data sets from different sources, and available formats require adjustment of collected data to their representational capabilities, often excluding potentially useful data. In this work we show the need and possibility of enhancing data management for social networks. The main technical challenge comes from the very nature of networked data and of the queries and analysis involved. We present preliminary results towards a data storage and manipulation model for social networks which natively supports attributed and dy-

dynamic multinet, using the full potentialities of standard database techniques. Following Freeman's ideas on methodological aspects of social network analysis and based on current practices, we determine requirements, describe a suitable data workflow, detect current limitations and needs, and illustrate via use cases. As a case-study we use DBLP, an online network of computer science authors and publications. The benefits from this framework include: independence between data and programs, data interoperability and reuse, incremental and automated data collection, data security, redundancy control and automated integrity checking. Summarizing, we argue that a sound theoretical and methodological data management foundation for social networks requires a dedicated database model (including data structures, operations and constraints), as it has been demonstrated in other application domains demanding intensive and large-scale data management.

Creating Dynamic Social Network Models from Sensor Data

Danny Wyatt
University of Washington
Tanzeem Choudhury
Intel Research Seattle

Henry Kautz
University of Washington
James Kitts

Conventional methods for collecting data about face-to-face social interaction (self-reports or third party observers) are laborious and potentially unreliable. We describe promising new developments in wearable computers, sensing technology, and machine learning that make it possible to record dynamic social interaction data automatically. In a study currently underway at the University of Washington, 24 students in a graduate program cohort have been instrumented with wearable devices capable of sensing location (using GPS and wireless internet signals), motion, audio, and other environmental variables. Analysis of data collected from these devices allows us to infer the subjects' physical activities (e.g. sitting, walking, standing) and their conversation behavior. Ultimately, this method allows us to observe social interaction among research subjects in real time over an extended period. In this project, we will demonstrate some new sociometric analyses made possible by these fine-grained longitudinal network data. Today we present results from a pilot study that combines models from statistical machine learning and traditional social network analysis to show a novel correlation between network prominence and conversation style (e.g. turn-taking behavior). Finally, we consider how to record such data automatically in ways that preserve the privacy of both study participants and non-participants while providing rich data for subsequent analysis.

W3: Network Autocorrelation Analysis

Autocorrelation in Social Networks: A Preliminary Investigation of Sampling Issues

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In this paper we reflect on the parallels and differences between autocorrelation in geographical systems and in social networks. In particular, we focus on some differences in the types of data used in these two fields. In geographical systems, for example, the units of analysis are usually zones sharing borders with other zones. In social systems, on the other hand, the units of analysis are individuals linked to other individuals by social ties. The ties in a structure of this type may remain constant or not over time, but geographical fixity is not necessarily a characteristic of the elements of the network. This lack of fixity points to a practical distinction, between what could be called geo-referencing and social-referencing. In spatial analysis, geo-referencing is accomplished by means of observational approaches. Once the zones in a system have been fully referenced, the relative position of the units of analysis is known, even if the connections between them cannot be unambiguously defined. Social referencing in contrast implies, in addition to the ambiguities involved in defining the connections between individuals, the complexity of observing the ties, defining the borders of the system, and dealing with missing observations – as the analyst may be unaware that observations are missing or where do they belong in the network. In this paper we are concerned with this second issue. Our objective is to explore, by means of simulated data, the implications for a model of network autocorrelation of working with sampled networks as opposed to complete networks.

Network Autocorrelation Analysis: A Comparative Specification Study of Planting Decision Making Process

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Network autocorrelation is the practical statistic model to investigate important interaction processes between actors, which can be regarded to contribute to production of a certain value. The matrix W is employed to represent the network structure. This technique is con-

sidered to be applicable to the service interaction process in IT system which will develop from now on. However, as Leenders pointed out, this technique has a subject about the plausible specification of matrix W .

In this research, we use the data of field variation of crop planting by 33 local governments of 21 years. In making decisions of production plan, each local actor can be considered to have taken the trend of other actors' behavior into consideration, besides the market price of the crop. More than 100 structure matrices were created and tested comparatively, using external data, such as distance index and the influence range of three diffusion-assist centers. In the end, the autocorrelation structure which agrees with the observation fact was extracted.

(1) It turned out that the more strategic crop had more influence by far actors. (2) After full-scale export started, remarkable autocorrelation between actors appeared. (3) The influences inside of northern, central, and southern regional block, around each diffusion-assist center, were stronger than those outside of each block. These results seemed to reflect the features of actual interdependencies. Furthermore, we show the simulation result about the validity of structure matrix, which would be important for phenomenon prediction or control.

Network Autocorrelation Analysis: New Application Possibilities of Direct Estimation Method for Weight Structure Matrix

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About the specification of the structure matrix W , which is the important subject of network auto-correlation model [Cliff and Ord 1973, Dow 1980, Doreian 1982], the comparison of Information Criteria of various weight structure matrices is advocated [Leenders 2002]. On the other hand, we hit on the idea of estimating the value of structure matrix elements itself as parameters, and named "direct estimation method". To accomplish this method, firstly, panel data is necessary to increase statistical degree of freedom. Secondly and optionally, the complicated calculation of Fischer information matrix is required to select significant element parameters of W . The merit of this method is that the effective network relations between actors can be automatically extracted by statistics. Currently, the network structure of interaction by 4 or 5 aggregated actors on mobile instant messaging system has managed to be obtained. We show the outlines of this method: details of the model, estimation procedures, simulation results, and empirical examples. Finally, we show subjects to be solved and the possibility of the future.

Network Autocorrelation Analysis: Parallel and Compounded Specification Approach to read the correlation Features of Text Interactions in IT system

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In case of IT system, much cross-sectional and time-series action data (=panel data) of actors are automatically collected to network server, while actors' profile data are relatively rare and rich observations are difficult to be done. Therefore, it is necessary to create candidates of structure matrix only with action data itself, without using external data. Then, we developed four kinds of specification method. Points of these methods are (1) cross-sectional simplification, (2) to make use of time-series common feature, (3) to make use of rich statistical freedom of panel data for direct estimation, and (4) to add assumptions to the (3), which save the number of parameters. Parallel application of these methods to the 15 actors' interaction on mobile instant messaging system showed that there statistically appeared four autocorrelation terms of all 11 weeks. At these terms, actors had face-to-face communication at campus or seminar-camp, and they had the same task to do (exam). Each specification methods produced the appropriate structure candidates, and the features of the best fit structure of each autocorrelation term seemed to represent the real interaction feature of that term. On the other hand, we tried to apply the compounded W made by each four representative matrices and estimated the ratios of each. Results of this trial showed the same tendency with the parallel comparison. In the end, we summarize these hybrid trials.

W3: Networks and Teams

I'd Like to Thank the Academy, Multiplicative Productivity, and Social Networks

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This paper explores under what conditions a film actor will be nominated for an Academy Award. Controlling for the actor's personal history and the film genre we explore hypotheses related to two distinct sets of predictions about the actor's social ties. First, we test the

extent to which the skill of team members complements the actor's performance. Screen actors are not isolated artists. They perform within the context of films, which see the input of other artists, including directors, screenwriters, and co-stars. This allows us to test whether the efforts of high quality workers spill over onto their team members. In other words, does having Robert DeNiro as a costar make one more likely to be nominated for an Oscar? Second, we test whether network ties to Academy members make an actor more likely to be nominated for an Oscar. The awards are based on peer nominations and votes and this allows us to test the effects of an actor's accumulated social network ties. That is, does your having worked with Robert DeNiro in the past make it more likely that he will nominate you for an award today? We use data from the Internet Movie Database to investigate the effect of embeddedness within a collaborative team on an actor's prestige. The dependent variable is the log-odds of an actor being nominated for an Academy Award and we count all Academy of Motion Picture Arts and Science acting nominations from 1927 to 2004. The sample includes 143,968 actors in 43,631 films with a total of 1,413 nominations and 290 wins. We find support for both hypotheses.

Social network analysis as a tool for intra-organizational development in an aerospace project team over time and role commitment

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This doctoral research reports results from a comparative approach in defining a model for high productivity and performance of cross-functional development teams in an aerospace engineering community. More specifically it explores cohesiveness and team dynamics over a 2-year period in a project team that recently designed and built a highly innovative propulsion system for a satellite to be sent to the planet Mercury. The successful focus team delivered this propulsion system ahead of schedule, below cost, and was considered a highly productive team within the researched company. Ucinet is used to map k-cores, month by month, for the entire life cycle of the project. The research focuses on analyzing the networks of heterogeneous engineers, with specific emphasis on social network dynamics for knowledge creation and sharing within and across team boundaries. Specific emphasis is also placed on team dynamics for developing a robust model to critically evaluate these findings in relation to other similar teams for the phase two analysis which is to be conducted in 2005. This methodology is then compared to a less successful team to begin to determine those variables responsible for high productivity and overall success of a highly technical team. The

research tries to determine the lessons to be learned for other project teams at the company level and also discusses implications for theory and practice.

Social Networks, Social Identity and Role Conflict in Work Groups

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Drawing on organizational identity/commitment, small group and intra-organizational network literatures, the primary aim of this study is to find out how work group networks are associated with organizational identifications. Moreover, associations between work groups networks, role conflict, co-operation and personality are examined. Data consists of 100 work groups with 595 members from various private and public sector organizations in Finland. Data was collected on 1) internal and external networks of work groups (communication, resource dependence, advice, social support) 2) members' perceptions of the job, work group and organization (social identity, role conflict etc.) 3) individual-, work group- and organizational-level background variables. Preliminary results indicate that density of work group networks and external ties to other work groups was associated with stronger work group identity, while external ties to managers was associated with weaker work group identity. However, associations between network variables and organizational-level identity were weak. Furthermore, network density predicted less role conflict and more favourable perceptions of group co-operation. Also, group members characterized by lower neuroticism and higher agreeableness occupied more central positions in work groups.

Already Got a Date? Reciprocal Preferences, Relationship Development and Performance in Teams

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Previous research has shown that the initial interaction in dyads accurately predicts future relationship development. We extend these findings from the individual to the team level. We use a mathematical framework that generalizes pair matching based on initial contacts from dyads to teams which we call "team dating". In the approach, the information on the participants' assessment of the short initial bilateral interactions ("speed dating") is used to create teams for which the number of reciprocated positive assessments is maximized. In the empirical part of the study, we describe the development of relationships within 23 student teams (3-5 members) formed through team dating after a period of three months and after completing several different assignments in various courses. We then explore the relation-

ship between intra-team structure and cohesion as well as performance and team members' satisfaction and formulate some conclusions for further research on networks and teams.

W3: Missing Data

Missing Information:

The impact of missing data in a network analysis

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Using an algorithm to generate sample network matrices, data was removed randomly to determine the impact on several measures of centrality. Distributions around the mean are analyzed to determine how missing edges and node impact centrality statistics against a reference perfect information model. This work has implications in terms of its use to enable corrections in network analysis measures when the pattern of missing data is random rather than structured.

Network Inference with Missing Data: a Performance Comparison of Existing Methods

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Many graph-level properties of interest to network analysts (e.g., connectivity, betweenness) are dependent upon global knowledge of the network under study. In many cases, however, missing data (e.g., due to data loss or non-response) renders some portions of the network unknown to the researcher. Previous approaches to this problem have generally involved either exclusion of missing actors from analysis, or else imputation of the unknown network in some fashion (i.e., network inference). Where multiple observations are available on each edge, a number of methods exist for network inference in the case of missing data. These include heuristic estimators such as locally aggregated structures and the central graph, as well as model-based approaches (both frequentist and Bayesian). Here, we compare the performance of various network inference methods for the estimation of node and graph-level indices, under varying levels of missing data. Our analysis employs systematically "degraded" versions of empirical data sets, as well as simulated networks. We demonstrate the extent of method robustness to missing data at the node and edge level, and provide suggestions for

the use of network inference tools in practical settings. Implications for data collection are also discussed.

Missing data in networks: longitudinal data analysis with missing observations

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Statistical modeling of longitudinal data on complete social networks is often hampered by missing observations on ties in the network. This may be due to attrition, when respondents drop out of the survey, composition change, when actors leave the network, or non-response, when respondents do not complete a sociometric questionnaire. This paper examines the problems caused by missing observations on ties, and describes methods to analyze incomplete longitudinal network data with stochastic actor-oriented models for network change. Data on friendship networks among college freshmen are used to illustrate the procedures.

Did you miss me? Missing data in social network analysis

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The missing data problem in network analysis can be seen as deriving mainly from three sources: (1) the boundary specification problem, (2) respondent inaccuracy (including the recall problem), and (3) non-response. Much focus in social network research has been placed on how to handle and minimize the effect of these missing data problem ex-ante data collection. However, not all network studies are equally vulnerable to missing data problems and not all missing data problems are equally correctable ex-ante data collection. By providing an overview of how specific choices in the study design affect the potential for each three types of missing data problems to occur, this paper makes a call for a more proactive perspective on the missing data problem in network studies. The paper identifies elements of network study designs (including relational form, relational content, level of analysis, and use of actor level measures) that make some network studies more vulnerable to the missing data problem. It is discussed how choices in the study design

can help minimize the risks of these problems occurring, and provide for the options of utilizing data modelling techniques to diminish the effect of missing data.

*W3: Innovation, Organizations, Networks,
and Technology*

*Determining Factors in the Usage of Software
Applications By End Users in a Not-for-Profit
Environment*

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Much research has been devoted to trying to understand and predict adoption and usage of software applications because people are often still unwilling to use the applications, regardless of the quality of the applications. This paper is unique because it specifically examines social network information unlike other models (e.g. TAM, TPB). In addition to controlling for demographic factors and software characteristics, the research compares perceptions of the users with expectations of the managers. We had a 100% response rate from the 76 computer users at a not-for-profit organization. Through the use of the linear assignment procedure we evaluate not only the amount of software used, but also which specific software (of 24 applications) is used. Not surprisingly, the individuals' centrality and betweenness in the social network were non-factors in influencing software usage. The peer network had a mixed influence. People tended to use software they thought people that covered for them used. However, they did not tend to use software used by people they covered for. Notwithstanding, both were influential in the perception of required software. The social network influenced specific software application usage only indirectly. However, this friendship network did influence the perception of required software. Friends tended to perceive the same software applications were required. Because respondents were more likely to use software they perceived they were required by their supervisor to use, there is this indirect effect on usage of the social network structure.

*The Role of Simmelian Ties in
the Generation of Innovation*

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While there is widespread agreement about the importance of accessing distinct bodies of knowledge for the generation of innovations, the mechanisms through which diverse sources of knowledge are reconciled and translated into innovative outcomes are far less understood. In this paper we argue that not all ties are equal with respect of their ability to transfer and enable the use of diverse sources of knowledge toward the generation of innovations. Focusing on a specific category of network ties (simmelian ties) we provide a detailed examination of the conditions under which individuals are able to benefit from knowledge sets located across different organizational boundaries. We evaluate our claims by looking at social networks and patenting activities of 276 scientists, researchers, and engineers in the R&D division of a large semiconductor firm.

Engineered Innovation:

*A framework for analyzing the 2nd order
effects of Diffusion and Social Network Analysis*

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The innovation Diffusion s-curve of adoption is often used to describe the framework inside of which innovations are being adopted. Although its characterization in different circumstances is robust in the aggregate, individual nodes of the network may behave differently; further, current analytical tools offer little guidance for how to move from early adopters to mainstream users. The simple descriptions of nodes in a network such as centrality, while useful to gauge their importance, do not properly indicate their impact for the purposes of predicting and designing systems for innovation diffusion. For any one node, the effectiveness of these measurements is temporal and situational. For example, adoption depends on the network of '2nd order effect' nodes that are the first adopters after those that have direct connection to the innovation development team. This group represents the adopters after the earliest adopters. For any particular innovation, there are circumstances under which a correlation exists between the rate of innovation adoption in this group and the ultimate innovation diffusion. In this paper, we characterize key aspects of social networking analysis (SNA) and Innovation Diffusion Theory and then develop a framework for a combination of the two focusing on the areas that highlight our work in 2nd order effects.

*Accelerating the Diffusion of Innovations:
A "Digital Diffusion Dashboard" methodology for global
networked organizations*

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A central problem faced by today's management is the speed at which innovations can be implemented. To help accelerate the diffusion of innovations, the National Science Foundation has funded a three-year study to develop and test diffusion theories in IT- driven global organizations. Researchers are collecting data which flows through the information technology infrastructure at Ford Motor Company, General Motors Corporation,

and DaimlerChrysler Corporation to display diffusion patterns and networks dynamically in a "digital diffusion dashboard". The Automotive Industry Action Group will help disseminate widely the findings and deliverables from this study. The IBM Corporation, as a partner in the study, is providing both IT and research expertise. A key deliverable is the development of a digital diffusion database of a range of innovations (30 – 60) across the three organizations that will become available in the public domain to other researchers. The purpose of this paper is to provide an open forum for discussion among academics and business practitioners about the key theoretical and technical attributes of the database. The discussion will center on the types of innovations and parameters for data collection that will be most useful to network researchers to build the most comprehensive and valuable database to inform both theory and practice.



Wednesday Afternoon Part Two

W4: Intra-Organizational Networks and Job Performance

*Nice to See You, But Send Me an E-mail: Social Capital
and Individual Performance in Distributed Teams*

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Prior research suggests that the performance of individuals in distributed teams suffers due to the extensive use of electronic communication and lowered availability of face-to-face interactions. Such a position is often based on the view that social capital is derived primarily, if not solely, from face-to-face interactions. Does the communication mode by which a relationship is maintained influence an individual's social capital? This paper broadens the conceptualization of social capital, viewing it as a resource arising from electronic interactions as well as face-to-face interactions. Data from 254 individuals in 18 established distributed teams suggests that an individual's face-to-face and electronic communication networks are differentially associated with social capital and performance. When the social capital from each type of

interaction is examined separately but simultaneously, only the social capital derived from electronic interactions is significant and positively related to individual performance. This is true regardless of an individual's level of colocation with team members. Findings also suggest that prominence in electronic interactions, more so than cohesion, is related to superior individual performance in distributed teams. Multilevel analysis using HLM shows that individual social capital and team task complexity interact to influence individual performance. The study contributes to a richer conceptualization of the sources of social capital and its role in influencing performance in distributed teams.

A relational perspective on new hire integration

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The American workforce is a highly mobile one. On average, workers change jobs ten times between the ages of 18 and 37. Time spent in training and orientation can be a substantial financial drain, costing employers as much as one to two and half percent of total revenues. Some research indicates that both the types and patterns of relationships that new hires establish can have a substantial effect on how effectively they're integrated

into their firm. However, we know little about what most effectively determines the formation of these relations. I examine the effect of various types and patterns of social relations on how new employees – specifically, software engineers – come up to speed in a firm. The aim here is to link the evolution of new employees' firm-specific social networks with the speed with which they become productive. That is, how does who you know and when you meet them affect the time required before being able to accomplish work without direction or instruction? I follow a sample of new hires through their first crucial months at the firm, tracking key relationship-development behaviors and relate those patterns to self, manager, and peer perceptions of productivity.

Social and spatial networks of the learning organisation

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Organisational learning is regarded as a key factor in the development and prosperity of organisations (Argyris/Schoen 1995; Ancona et al 1999). The large number of publications in this field in recent years shows the increasing importance of this topic (Dierkes et al 2001). Yet there is little clarity in definitions, aims and measurements concerning the corresponding phenomena of knowledge management, collective intelligence and learning beyond the individual level (Romhardt 2002). This paper suggests analysing organisational learning from a twofold network perspective: on the one hand Social Network Analysis can reveal interaction patterns that are the underlying principles of learning on an organisational level (Pryke 2005). On the other hand spatial network analysis like Space Syntax can explore the possibilities that space can generate for movement, interaction and social life in a workplace environment. Space syntax is based on the idea that every spatial element like for example a convex space or an axial line can be seen as one node in a network. A measure comparable to centrality (called integration in Space Syntax terms) can reveal a correlation between the number of people present in a certain space and its corresponding integration values. Thus the configuration of spaces and the connections between spaces have been proven to be highly influential on collective human behaviours through the powerful concept of presence and co-presence of people (Hillier 1996; Penn et al 1999). The two methodologies of SNA and Space Syntax shall be combined to gain insights into organisational learning. Social and spatial networks are overlaid to explore the influence of space on social networks at the example of a university faculty in central London. More precisely, the posi-

tion of a person in a spatial network like an office is assumed to influence his/her social networks. Thus evidence of the multi-faceted relationship between social networks and spatial configuration will be presented and conclusions on the promoting or inhibiting powers of spatial and social networks to organisational learning will be drawn.

*Informal Network Isolates and Individual Performance:
Can Isolates Perform Better than Central Employees?*

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Research shows that an individual's informal network centrality exerts a positive impact on the employee's performance through the access to information (Baldwin, Bedell, and Johnson, 1997; Sparrow, Linden, Wayne, and Kraimer, 2001; Mehra, Kilduff and Brass, 2001; Ahuja, Galletta, and Carley, 2003; Barsness and Diekmann, 2005; Milton and Westphal, 2005). This assumes that informal network isolation exerts a negative impact on employee performance, and, consequently, individuals who are isolates are often forgotten in these studies. This paper proposes conditions under which isolated individuals' performance may be superior to that of more central individuals. Specifically, I discuss those situations in which the information attained by central employees may not be necessary, and possibly detrimental for high performance work. Based on Steiner's (1972) performance framework, which includes task demand and resources, I consider types of occupations, types of network relations, resource availability, characteristics of network flows, and formal hierarchy that may produce a positive relationship between informal network isolation and individual performance. An example is a faculty member who is an isolate in his or her department's friendship and advice networks, but publishes frequently in high quality journals and thus, is considered a high performer.

*Contracts and Cliques: An Organizational Response to
Short-Term Labor Market Uncertainties*

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Sociological studies of economic transactions offer valuable insights into the role of networks in managing transaction partners' uncertainty but leave aside the role of contracts in whose shadow networks often operate. The paper explores a specific labor market setting in which both incentive contracts and informal relationships help a telemarketing firm deal with uncertainties of labor supply. The analysis shows that when agents work without contracts, the cohesion of the workplace's informal network positively affects the length of an

agent's work spell. The effect increases with the number of the agent's ties to the network and mitigates the negative impact of limited work hours and income targets that agents may be guided by in their quitting decisions. However, when an agent is under contract, the role of the informal structure is negligible. I conclude that in this context networks work as a substitute rather than a complement to contractual relationships.

W4: Personal Networks A

Internet usage and social network characteristics in contemporary Hungarian society. A longitudinal analysis

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We examined Wellman et al.'s question "Does the Internet Increase, Decrease, or Supplement Social Capital?" (2001) on Hungarian data. The longitudinal analysis was based on a sample of more than 2000 Hungarians from 3 waves of the World Internet Project (2001, 2002, 2003).

All data showed that adopters possess a higher level of social capital than the non-users. People's chance to become an Internet user is more than twice as much if they have friends than if they don't. Internet usage increases social capital: for the longer-time one is an Internet user the more likely that he could broaden his social sphere by means of the Internet. Our data also confirm that this doesn't happen at the expense of existing offline relations. Our results are quite convincing in the case of the adopters: no matter how high the level of their social capital is at the starting point of Internet usage, their sociability rate is still lower than that of the users because the former respondents simply didn't have enough time to make the best of this communicational tool.

When exactly do social relations become a resource?

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In this paper I explore how structural factors of individual relations (i.e. strong and weak ties) and network structures influence the support benefits (e.g. instrumental and emotional benefits). To investigate this question I use the data from a network study of 1951 families with children under the age of 18 living in the household in three German cities (Hamburg, Stuttgart and Berlin). I conclude that Granovetter's distinction between strong and weak ties has less explanatory value for social benefits than do other structural factors. This can be attributed to Granovetter mixing three levels which ought to

be analytically distinct: the relation type, the contact intensity of relations and the information content. For example, family and friendship relations may vary with respect to their information content or the social support or their contact intensity in a network. Also, work relations do not automatically provide more information and are not necessarily less intensive. Studying the social support in German families I found that social support is not simply the result of a single relation but rather of the complete network structure. It is primarily the heterogeneity of the network which has a bearing on the social benefits. Heterogeneity is determined by the composition of the network actors with regard to age, gender and social context (e.g. family, co-workers). With the increasing of the network heterogeneity social relations and their support potentials become a resource for individuals.

Bourdieuian Class and the Socio-logic of Affiliation Choices

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When are individuals who belong to majority racial/ethnic groups more or less likely to select people from minority groups as friends? Previous answers to this question have mainly focused on the structural effects produced by the relative distribution of racial/ethnic groups on individual choice (Blau 1977) or on the presumably universal preference for similar associates (McPherson et al 2001). However, the question of whether we can connect variation in the propensity to have interracial friendships to the social class position of the chooser has not received equal attention. In this paper I shed light on this question by drawing on Bourdieu's theory of class fractions and the related notion of the class-based habitus as an "analogical operator", which is able to orchestrate homologous choices in heterogeneous domains. This allows me to predict when individuals who belong to particular class fractions – as defined in Bourdieu's scheme by the relative distribution of cultural and economic capital – will be more or less likely to form close friendships with individuals who belong to different racial/ethnic groups. I show that the social logic of race-based friendship selection is in fact homologous to the logic of affiliations in other choice domains. Whites who occupy class positions biased toward cultural capital (relatively dominated fractions) are more likely than individuals from dominant class fractions (high on both economic and cultural capital) to select friends of a minority racial/ethnic group. However, consistent with the homology thesis, occupying a dominated class position has a positive effect on interracial friendship only when alter belongs to a dominated racial group. Whites who belong to dominated fractions are less likely to be friends with individuals who belong to minority groups who occupy relatively dominant positions. Subsequent

analyses shows that none of these effects are a by-product of structural effects related to the relative distribution of racial/ethnic groups across occupational groups.

Maintaining the old and building the new: Personal relationships after a residential move

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Though personal relationships naturally come and go over the course of a lifetime, certain events can trigger a change in one's social network. We focus on one such event, a residential move, and suggest that the mechanisms used to maintain old personal relationships in the prior location differ from those used to build new personal relationships in the current location. Using longitudinal data from over 500 survey respondents shortly after the residential move and again 9-12 months later, we find that social support and feelings of closeness toward the partners remain the same for old relationships, but increase for new relationships over time. More interesting, an increase in phone communication over time is associated with greater support and closeness for old relationships, while an increase in face-to-face communication over time is associated with greater support and closeness for new relationships. Despite the availability of modern communication technologies, such as email and instant messaging, personal relationships continue to benefit primarily from traditional forms of communication.

The development of personal friendship networks

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Previous studies suggest that people change their personal friendship networks when facing major life events. However, few researchers study how and why people develop their personal friendship networks when facing major life events. This research explored how and why students develop their personal friendship networks during transition to university. 56 first year university students (including 30 Canadians and 26 Chinese international undergraduate students) participated in this research. To obtain sufficient information about the changes in their personal friendship networks, participants were asked to complete the Personal Friendship Network questionnaire 3 times within their first academic year; to find out how and why they changed their personal friendship networks, participants were also interviewed twice within the first academic year. Results have shown that the sizes of students' personal friendship networks increased in the first six weeks of their first

academic year and then remained stable; students replaced their pre-university casual friends with new casual friends and tried to maintain their pre-university close friends while making new close friends at university; the proportions of student's close friends in their personal friendship networks were slightly decreased during their transition to university. Results also show that Canadian students and Chinese international students developed their personal friendship networks differently at both the network level and the dyadic level. This research has also found that gender and personal beliefs of friendship affect the development of students' personal friendship networks during transition to university.

W4: Infectious Diseases and Social Networks

A

Research issues regarding "Big Events," changes in risk networks, and the spread of HIV

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Some, but not all, "Big Events" such as wars, revolutions, socioeconomic transitions, economic collapses, and ecological disasters in recent years seem to lead to large-scale HIV outbreaks (Friedman et al, in press; Hankins et al 2002). This was true of transitions in the USSR, South Africa and Indonesia, for example, but not those in the Philippines or (so far) in Argentina. It has been hypothesized that whether or not HIV outbreaks occur is shaped in part by the nature and extent of changes in the numbers of voluntary or involuntary risk-takers, which itself may be related to the growth of roles such as sex-sellers or drug sellers; the riskiness of the behaviors engaged in by risk-takers; and changes in sexual and injection networks and other "mixing patterns" variables. Each of these potential causal processes, in turn, is shaped by the nature of pre-existing social networks and the patterns and content of normative regulation and communication that happen within these social networks – and on how these social networks and their characteristics are changed by the "big event" in question. We will present ideas about what research is needed to help understand these events and to help guide both indigenous community-based efforts to prevent HIV outbreaks and also to guide those who organize external intervention efforts and aid.

Evaluation of partner notification for syphilis; before and after enhanced social network strategies; Vancouver, Canada.

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In August of 1997, the number of cases of syphilis in British Columbia exceeded the mean and two standard deviations. Partner notification; the process of identifying; locating; testing; and treating exposed sexual partners, was conducted for those cases who were willing and able to recall their sexual contacts. In February 2002, staff at British Columbia Centres for Disease Control attended training in enhanced interviewing techniques. Questionnaires and a database were developed to capture social and sexual network data on clients; sex partners, and acquaintances. Also, networks of connected cases and contacts were constructed at weekly outbreak co-ordinating meetings. Two sets of data on cases and contacts were available for analysis, one kept since the start of the outbreak in August of 1997, until March 2001; and the second, from January 2003 to October 2004. Two hundred twenty-nine contacts were named 242 times during first study period, and 1,763 from the second time period were named 1,394 times. Of the contacts from the first time period, 134 or 57% tested positive, and during the second period 762 (54.7%) tested positive. Although there were eight times more contacts to be managed than during the first period with only minimal addition staff time; and given case yields from a recent review with median of .23 cases brought to treatment for each index case, ours of .42 in the early period and 1 in the second period in this challenging population demonstrates that the use of social network analysis can be a success.

Sex partner concurrency in a high HIV prevalence community

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HIV disproportionately affects African American women. Sex partner concurrency, both at the individual and partnership level, is associated with HIV transmission. In central Brooklyn, New York City, women who used drugs (i.e., heroin, crack, cocaine or marijuana daily) in the past 30 days were recruited 5/02-4/05 to investigate

social network characteristics underlying HIV transmission dynamics. Women completed a standardized network questionnaire and assisted recruiting network members, including sex partners, into the study. All were serotested for HIV and tested for three other sexually transmitted infections. We identified 95 sex partnerships (dyads) that were active in the past 30 days. Participants were asked about sociodemographics, past and current sex practices, drug use and HIV status. Practices within partnerships were also ascertained, as was knowledge of partners' HIV status and behaviors outside the partnership. In 48 (51%) dyads, one or both partners reported having other current sex partners; in 31 dyads one partner reported concurrent partners and in 17 dyads both partners had concurrent partners. On average, participants reported 2.9 (sd 7.8; range 1-90) sex partners in the past 30 days. HIV prevalence among the 160 participants contributing to the 95 dyads was 12.5%. Sex partner concurrency likely underlies the high HIV prevalence and incidence consistently documented in this community. Factors contributing to concurrency will be explored.

HIV serostatus mixing patterns in sex partnerships in an African American community

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This analysis examines HIV serostatus mixing patterns and HIV status disclosure between risk dyads of African American women who use drugs and their sex and injecting drug use partners. In central Brooklyn, New York City, women who used drugs (i.e., heroin, crack, cocaine or marijuana daily) in the past 30 days were recruited 5/02-4/05 to investigate social network characteristics underlying HIV transmission dynamics. Women completed a standardized network questionnaire and assisted recruiting risk network members (i.e., sex and/or drug use partners) into the study. All participants were HIV serotested. The HIV serostatus concordance/discordance was determined for each dyad. HIV disclosure within dyads was also assessed. 178 unique dyads were constructed and shared risk practices within dyads were assessed. 111 (62%) were sex partner dyads; all 8 dyads in which partners had injected drugs together were also sex partnerships. The HIV seroprevalence was 15%. 29 (26%) of the 111 risk dyads were serodiscordant: 28 (27%) of the 103 female-male sex partnerships, 1 (13%) of the 8 female-female sex partnerships and 4 (50%) of the 8 IDU partnerships. Half (n=57, 51%) of 111 sex partnerships did not fully disclose an HIV status and 15 (48%) serodiscordant sex partnerships did not fully disclose. HIV serodiscordant mixing patterns occurred in over one quarter of risk dyads, only half of whom knew

they were in an HIV serodiscordant sex partnership. The sexually mediated risk of HIV transmission was appreciable and likely contributes to the consistently high HIV incidence found in this community.

The importance of “house regular” clients and bridging in sexual networks of massage parlour-based commercial sex workers (CSW) in Vancouver, Canada.

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In Canada, most commercial sex work occurs indoors, including massage parlours, escort agencies, and body rubs. The risk environment for HIV and sexually transmitted infections (STI) in the indoor sex industry is largely unknown, as is the extent and structure of the sexual networks. We conducted in-depth network interviews with 49 CSW who worked in 7 massage parlours. Respondents provided proxy data on 234 sex partners (88% were commercial clients) and identified 266 second-order sex contacts of their partners. The network was comprised of a single component (size 549) with a density of 1.1%, median degree of 1 (mean 5.4), median nbetweennes of 0.03, median information centrality of 0.49, and a very high frequency of cyclic microstructures. One of the most striking features of the network was the extent of bridging between sex venues, and between the commercial sex core and the general population. Fifty-two percent of both CSW and their clients bridged to the general population through intimate, non-commercial partners, and 36% of clients were known to bridge between sex establishments. Furthermore, 18% of clients were identified as “house regulars” (HR), defined as men who visited the establishment regularly and had sex with all the workers. Compared to other clients, HR had a higher median degree (24 vs 2), information centrality (0.89 vs 0.49), and were more likely to be a part of a clique of $n=3$ (41.0% vs 0.6%). We conclude that the indoor commercial sex network may be fully connected through bridging behaviours of clients. A high frequency of cyclic microstructures and the overall network cohesion may provide transmission pathways that facilitate STI propagation. Implications for targeted education and intervention are discussed.

W4: Civil Society and Public Sphere

Contextualizing Weak Ties in Service Encounters

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The “ideology of intimacy” refers to the privileging of strong network ties, such as family and friends in both academic research and in the larger cultural world. Nowhere is this privileging more evident than in the study of interpersonal and health communication, and specifically social support, where minimal attention given to “weak ties” or encounters that are often public, fleeting, and context-bound. For example, we know little about the role of “strangers” “transient encounters” or “service interactions” in everyday life, much less in coping with stress and crises. Broad network studies indicate that “weak ties” are critical to perceived sense of community and diffusion of information. Although such network studies are informative, apart from positionality to other social relationships, they do not contextualize weak ties. How do physical and temporal contexts, role relationships, dyadic qualities influence the likelihood that weak tie connections will function as social support?

A major form of informal support is found in service encounters – from hairdressers to financial advisors. After all, why do customers tell their secrets to bartenders? These encounters are pervasive forms of social life and consume much of our daily life. The intersection between commercial and therapeutic outcomes suggests a classic form of weak tie support. Apart from direct delivery of support, these service personnel serve as lay referral systems and “community brokers.” Lay referral systems provide conduits to other services, particularly medical information, and as such compensate for the limitations of personal disclosure to strong ties (e.g. rumour control, embarrassment). As community brokers, service providers are critical to cultivating our sense of place that is grounded in the “routines” of local space, where “everyone knows your name” or at least your face. Urban studies, community psychology, ethnographic work all point to the ways small scale locale businesses become part of the social fabric of the locals. This presentation is intended as a vivid and provocative session on weak ties, and specifically on relationships often ignored in our study of community, social support, and communication. Video excerpts from the presenter’s ethnographic video work will examine service providers in the retail and service industry; including a clothing store for plus-size women, a sex toy store for women, and an internet sex worker. Due to the marginality, taboos, and stigma often associated with these services and products, these encounters provide rich points for contextualizing weak tie support. Audience members and the presenter will outline the contextual and rela-

tional features that contribute to social support in these encounters and the implications for praxis. Hopefully this presentation will augment our understanding of context in cultivating weak ties as sources for social support.

Using Social Network Analysis to Explore and Predict Performance in Public-Private Partnerships: a case-based analysis of Genomics-based R&D Networks

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Globalisation and the quest for competitiveness in a global market represents a new era of connectedness within public-private networks of experts in an effort to pursue research objectives in advanced technology industries. Balancing the competing interests of public good and private gain, reducing the barriers in terms of access to knowledge and intellectual property and ensuring that efforts result in socially valuable outcomes in the form of new innovations can be difficult, to say the least. Although widely advocated, networks or collaborations have not, as yet, been fully examined nor have appropriate performance evaluation models been developed to evaluate them.

How to Build Useful Neighborhood Information Systems: Leveraging Public Private Partnership Network for IT innovation

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The central purpose of this research is to examine stakeholder dynamics in the Information Technology development partnership network, which is to build Neighborhood Information System (NIS). NISs are hybrid applications of Geographical Information System (GIS) and web technologies that provide demographic, social and economic information to community stakeholders. In the past decade, NIS became an emerging IT innovation tool to support community and economic development. In the early 1990s, NISs in Oakland, Boston, Providence and Denver began distributing neighborhood socio-economic information to community-based groups. In 1993, Cleveland's CANDO became the first Internet-based NIS (available through a telnet connection). Today, twenty NISs are partnered with National Neighborhood Indicator Partnership (NNIP), the Urban Institute. There are at least dozen more, and even more in the planning and development stage. These NISs use many different governance and funding forms. Some are based in universities and some in municipal or county departments. Due to the complicated nature of data collection and information sharing in addition to resource scarcity, partnership is a must in developing NIS. Three major resources for NIS development are data, funding, and

technology. This research will also investigate resource exchange patterns in addition to stakeholder dynamics to suggest 'best practices' to build NISs. Four NIS sites are selected to study partnership dynamics in the network by 'size of the city and partnership' and 'type of focal organization in the network'. They are Pittsburgh, Cleveland, LA and Providence NISs. Despite a very large and growing investment of public, private, and foundation dollars, very little is known about how to build and maintain NIS in an effective and efficient way.

Public sector brokerage: The effects of public sector interventions on regional competitiveness

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There are many claims in the literature that network structures give rise to positive effects in a local economy. These claims are often exaggerated. In the main the effects are at best implied, but more often than not they are hard to measure. Our recent research attempts to empirically explain the links between network structures and prospects for regional growth. It focuses on a specific publicly funded project, where a local regional development agency (RDA) has taken the initiative to create a public sector agency to encourage and develop a network of high performance companies. The basis for this is the belief that through encouraging networks and networking behaviours there will be benefits for the organisations and the region. For instance the theory-in-use is that networks between these agencies will give rise to increased gross value added (GVA) which will in turn lead to increases of the regional GDP.

Our work explores the links between networks and regional development. This paper addresses the theory-in-use in the project through evaluating the effects of the project on the regional economy. We undertake network analysis coupled with economic clustering analysis. We also integrate classic network theories with an organisational behavioural perspective.

In terms of network theory we acknowledge the value of 'structural holes' (defined by Burt, 1992) in research on regional clusters (Gulati et al, 2000; McEvily, and Zaheer, 1999), and also the 'strength of weak ties' thesis (Granovetter, 1973) often cited by researchers exploring regional clusters in terms of the value of casual acquaintances in discovering new opportunities (e.g. Gordon and McCann 2000). We explore these concepts to determine whether the position and roles of the prominent actors are relevant to regional development. This analysis also examines the network horizon of actors in terms of the active and passive ties they cultivate. The paper addresses a number of questions. How does the public

organisation define its boundaries? How does the public organisation attempt to effect brokerage? What is it they should be doing to improve the brokerage effects? Are there any measurable effects of attempts at brokerage to the regional milieu? The paper will conclude with a series of policy recommendations.

Cross Talk? The Role of Neighborhood Associations in Political Discourse

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One institutional innovation, the creation of local governance bodies such as neighborhood councils, is directed, at least in part, to promote cross-cutting political discourse. These innovations create forums for the deliberation of local issues, aggregation of political information and political demands, and for communicating local interests to the policy-making process. The degree to which such forums support political cross-talk has important effects on the type and quality of local information that is developed, on the potential solutions identified for problems, and for the more general development of civic skills. Nevertheless, little is known concerning the amount and type of cross-cutting discourse fostered by such local governance bodies.

This research explores this question employing social network data for 41 neighborhood councils in Los Angeles. The paper employs social network analysis to relate diversity measures of neighborhoods to the patterns of discourse in neighborhood councils. It is hypothesized that personal characteristics of neighborhood council members in conjunction with neighborhood characteristics mediate exposure to differing political perspectives. We consider whether there is variation with respect to the effects of interaction across dimensions of differences (e.g. ideology, policy preferences, partisanship, and socio-economic characteristics) and across type of interaction (e.g. face-to-face versus e-mail). Finally, we examine the extent of the association between exposure to differing political perspectives and political knowledge and tolerance.

We employ some new methods to test for homophily in multiple networks. We use a Lieberman Index of population heterogeneity to calculate a baseline measure of heterogeneity assuming random mixing of population individuals. This measure can then be compared to group heterogeneity and heterogeneity within observed networks of contacts. We employ fixed effects meta analysis to determine the underlying homophily effects across all groups.

W4: Ethnic Factors and Immigration

Wista on the Sound: Information Grounds and Identity in Seattle's Polish Community

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Studies of Polish communities were first published in the early 20th century; later studies examined cities besides Seattle. Although rich ethnographies, they examined communities through older frameworks, equating community with neighborhood. Today, most communities are no longer defined by neighborhood boundaries. Seattle's small Polish-American community is a prime example. Transcending neighborhoods, this social network encompasses scattered social events and gathering places to promote Polish culture and connect Polish-Americans with their roots. In this ethnographic study, I interviewed community members and observed popular gathering places. Observations include descriptions of community spaces such as a church, delicatessen, and cultural center which recently celebrated its 86th anniversary. Additionally, the study describes events, people, and social phenomena within them. Key informants – business leaders, professors, and radio broadcasters – were interviewed in order to gauge how they found community information and where they went to find it. They were also asked about various aspects of the community and their roles within it. In addition to painting a vibrant picture of the social, virtual, and cultural landscapes of Seattle's Polish-American community, these narratives identified information grounds and how they were used to radiate community information. Information grounds were defined by Fisher as temporary environments in which people come together for some instrumental purpose yet, because they socialize, there is a spontaneous and serendipitous exchange of information as a byproduct. This study demonstrates how the social nature of information exchange, via information grounds, establishes a sense of community and cultivates Polish identity within this geographically disparate social network.

Ethnic Contingencies of Closure and Brokerage-Based Forms of Social Capital in the Context of Education

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Scholars have long argued that social capital is critical to the academic achievement and subsequent assimilation of immigrant youth into the host country. The underlying assumption being that individuals or groups who are better connected are able to access and benefit from the resources embedded in their social relations more than those who are not. However, despite a shared under-

standing of what social capital is, scholars continue to disagree about what network mechanisms make one “better connected” (Burt 2000). This project draws on ego-centric network data from the National Longitudinal Study of Adolescent Health (Add Health) to compare the effect of closure and brokerage-based network mechanisms on the educational attainment of second-generation Mexican-American and Chinese-American immigrants. Using multi-level modeling to control for school context, I show that the value of closure and brokerage-based forms of social capital is in fact contingent on the distribution of socio-economic resources in these students’ homes and the schools they attend. Moreover, I provide evidence that Mexican-American students who engage in diffuse, brokerage-based networks are better able to locate and benefit from the resources they are lacking in their homes, resulting in greater educational outcomes.

Mapping Artistic, Cultural, and Network Assets in the Chicago Metropolitan Area: Context, Project Design, Implementation, and Initial Findings

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Over the past few years the Chicago metropolitan area has become a key temporary and permanent destination for Mexican transnationals. Post-NAFTA Mexican immigrants have combined their cultural, artistic and network resources to create hybrid behavioral and cultural forms unlike those commonly used in America or Mexico. The use of these hybrid forms allows migrants to leverage their social and cultural resources to gain access to basic assistance, jobs, social support services, and other types of group-based or group-facilitated resources. The Mexican Immigrant Assets study investigated multitheoretical and multilevel analyses of the artistic, cultural and networking assets of recent Mexican immigrants (post-1994) in the Chicago metropolitan area. Between March and August 2005, a six-person research team gathered data through participant observation open-ended interviews, and social network surveys from 40 organizations and 75 individuals selected through a semi-random recruitment process. This study, conducted in conjunction with the Field Museum in Chicago, combined innovations in ethnographic research with new digital techniques for capture, real-time visualization and one-touch network discovery of egocentric social networks. These capabilities were used by the network and ethnographic researchers to investigate in greater detail the extent to

which the popular “network theory of migration” is borne out by the realities of life for the Mexican immigrant community in the Chicago metropolitan area. This paper presents the motivations for the project, briefly explains the methods used, and, finally, presents initial findings and policy implications from the project, calling attention to how those findings correspond to current thinking vis-à-vis ‘network theory of migration’ and to the current immigration policy and immigrant support environment.

Ethnography and Social Network Analysis as Complimentary Methodologies for the Study of Artistic, Cultural and Networking Practices among Recent Mexican Immigrants in the Chicago Metropolitan Area

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This paper reports on the methodological innovations associated with a study jointly conducted by ethnographers at the Field Museum in Chicago and social network researchers at the Science of Networks in Communities (SONIC) research group at the University of Illinois. The Mexican Immigrant Assets study investigated multitheoretical and multilevel analyses of the artistic, cultural and networking assets of recent Mexican immigrants (post-1994) in the Chicago metropolitan area. Between March and August 2005, a six-person research team gathered data through participant observation open-ended interviews, and social network surveys from 40 organizations and 75 individuals selected through a semi-random recruitment process. Social network data were analyzed to discern the structures and content of networks, and to understand how these structures influenced and were influenced by artistic and cultural practices. Qualitative analysis of unstructured data (over 1,000 pages of field notes and interview transcripts) performed with ATLAS.ti 5.0 software revealed complimentary insights about the relationships that constitute these social networks. Some of these elements included individuals’ and organizations’ motivations for engaging in artistic, cultural and networking practices; activities and organizations that are imbued

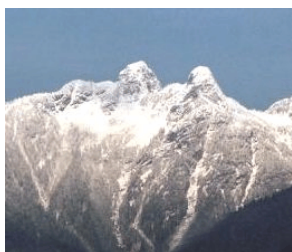
with meaning for immigrants; and the connections between immigrants' identities and the artistic, cultural and networking practices in which they engaged. In this talk, we focus primarily on identifying the factors that led to the synthesis of ethnography and social network analysis and explaining the new approaches that the research team developed. These new approaches combined innovations in ethno-graphic research with new digital techniques for capture, real-time visualization and one-touch network discovery of egocentric social networks.

Double Take: Using Egonet to Measure Transnational Social Relations

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Personal networks can be used to measure both acculturation and transnationalism, reflecting the fact that

immigrants maintain social connections to their countries of origin at the same time as they engage in processes of acculturation in receiving countries (Kivisto 2001). Moreover, as transnational social spaces, personal networks allow for examining social relations immigrants maintain beyond countries of origin and settlement, particularly in cases where family members and friends have migrated to third countries. This paper evaluates the use of personal networks to measure transnationalism among Senegalese and Gambian immigrants in Spain. Standard demographic questions about the respondent and questions scaling the transnational activities of respondents are correlated with the strength of transnational social relationships between alters and respondents based on close-ended questions that include type of relationship, closeness, frequency of contact, and whether personal problems are discussed.



Thursday Morning Part One

T1: Social Influence and Diffusion

A Balance Theory Approach to Group Problem Solving

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Two distinct views dominate the problem-solving literature. Gestalt psychologists (Kohler, 1969; Wertheimer, 1982/45) emphasized the formation of an appropriate conception of problem structure and the experience of insight associated with sudden cognitive restructuring as the solution is recognized. Information processing approaches (Newell & Simon, 1972) assume an appropriate problem structure is known and emphasize incremental search within the corresponding problem space. Drawing on Heider's balance theory (Doreian, Kapuscinski, Krackhardt, & Szczygula, 1996; Heider, 1946, 1958) we propose an integration of these two views by conceptualizing problem-solving as a progression towards increased cognitive balance.

Heider's theory dealt with a socio-cognitive network of three nodes representing self, other, conceptual objects, etc., and positive or negative links based on node rela-

tions of liking, similarity, etc. In a balanced network the product of signs on the three links is positive. Unbalanced networks are associated with psychological tension, creating pressure to restructure the network, adjusting signs to achieve balance. Cartwright and Harary (1956) extended the theory to more complex networks and Davis (1967) proposed the concept of k-balance, corresponding to a network partitioned into k disjoint subsets with positive link relations within subsets and negative relations between subsets. We propose that problem-solving corresponds to a progression from imbalance towards a balanced state corresponding to the solution. Each change in sign restructures the network, incrementally increasing or decreasing total balance. Thus insight corresponds to significant and rapid network restructuring while incremental search corresponds to modest, slower restructuring. An experimental paradigm based on this conceptualization was developed to investigate group problem-solving by groups of four subjects. The method generalizes the "five squares problem" used in classic communication network studies (Bavelas, 1950, 1973) to enable the experimental manipulation of various dimensions of problem structure. Balance theoretic measures are used to evaluate group problem-solving behavior and performance. An overview of the experimental method and results will be presented.

Does interaction in workplace favor organizational identification? Evidence from three consulting firms

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In this paper we assess the extent to which relationships in a workplace environment affects processes of organizational identification. The current view of organizational identification is based on Social Identity Theory, and since it postulated that identification is an individual cognitive process because individuals identify in the organization in absence of interpersonal contacts, relationships among members of an organization have no more be taken in consideration in the study of organizational identification. Here it is argued that employees' identification in the organization they work for is partly the result of social influence effects within their network. We address this issue using survey based data that we have collected: the sample includes employees of three consulting firms. Some research questions are answered. Has interpersonal relations among members of an organization a direct influence on their organizational identification? The more a member has relationships with his/her network, the higher his/her identification degree is? Which position within a network is associated with more and which with less degree of organizational identification? Which relationship's content (communication, friendship, workflow network) is associated with organizational identification? Evidences of this survey appear to provide great support to the formulated hypothesis.

Group Decision Making

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A group decision occurs when group members select or settle upon one option from a set of alternatives and collectively consider that option to be the choice of the group. Social influence network theory has a bearing on how groups make decisions, because it presents an account of how interpersonal influences produce the interpersonal agreements that are at the foundation of many group decisions. In this paper, we describe how our theory is related to several lines of formal work on group decision making in which a decision rule, scheme, or procedure is invoked to reach a group decision. We also describe how our theory bears on an analysis of the structural conditions that affect the efficiency of the consensus formation process in a group. Finally, we develop a structural perspective on the groupthink phenomenon, in which pressures to reach consensus inhibit the thorough appraisal of options.

Social Influence Network Theory: Explanatory and Predictive Fits of the Standard Model

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Over the last several years, Noah Friedkin and the author have been developing a network theory of social influence in groups, based on a mathematical model to be presented here, which captures many features expected of a fruitful theory and model. Here we present results on how well different variants of our standard model explain or predict the empirical results from a set of experiments on the change of attitudes in various small groups (dyads, triads and tetrads) on five specific issues. Each group had an imposed dyadic-communication network under which the group was connected, and various non-isomorphic connected networks were imposed for the triads and tetrads. The five issues consisted of three "risky shift" issues and two "monetary award" issues, which were presented as follows: two risky shift issues to 52 dyads, all three risky shift issues to 32 triads, and all five issues to 50 tetrads. Overall, on the basis of our analyses, the different variants of our model explain or predict rather well the individual and mean final equilibrium attitudes on these issues for these groups.

The Social Structure of Freedom: A Structural Analysis of the New York Capital Region's Underground Railroad Activity

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It is our aim to lay the foundation for a social network analysis of the Underground Railroad movement in 19th century America. Due to the immense number of actors involved, we began with a geographically smaller area, the capital region of New York State, and performed the network analysis with a smaller set of actors. We discuss the history of the Underground Railroad movement and explain the reason for selecting this specific region, and this set of actors, and present their network socio-

grams. We also discuss the centrality of these actors with respect to one another and explain their roles using structural-hole (Burt, 1992) measures. Our aim is to proceed with this present analysis, and derive lessons from the associations to help us better understand the essentially entrepreneurial nature of these networks — how they bucked the system, went against the norm, were innovative and ingenious in their methods, developed complex codes to prevent betrayal and arrest, organized themselves with relative speed and were enormously (to a major extent) successful in their attempts to free slaves. In this endeavor, we would be looking for answers to the following questions. Were actors able to get consensus on decisions relating to the network? How long did it take to develop the networks structures? Were these transferable? When did cliques develop, and were these stable? Does a well designed cooperative network develop into a more or less efficient network? Answers to these questions will help us better understand the impact of communication patterns, network structure and social dynamics on the decision-making processes in entrepreneurial endeavors.

T1: Sex, Drugs, and Social Networks A

The Impact of Preventive Group Intervention on Adolescents' Education-related Social Ties and Satisfaction with Education

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This study examines impact of Towards Work life -group intervention on adolescents' social ties concerning education and career planning during last year in comprehensive school and the relation of social ties to satisfaction with education after comprehensive school. A total of 1035 Finnish adolescents (15-16 years old) participated in a randomized field study. Those randomized to the experimental group participated in the intervention group. The group intervention consisted of 15 lessons during five days and was trained by a pair of trainers. The aim of group intervention is to increase career management and vocational motivation and to prevent drop-out related to transition to further studies. Group intervention included lessons which focused particularly on social ties as a potential resource for educational and career planning. For example, processes involved group brain storming to diagnose ways to overcome potential obstacles or barriers to contact people. 9th graders were asked to fill in questionnaire before intervention and follow-ups were after intervention, in last spring at the comprehensive school and about half a year after graduation from comprehensive school. In the presentation we further examine to what extent intervention has impact on adolescents' social ties related to education and career

planning. For example, to what extent network content (e.g., increased number of school personnel) and structure (e.g., redundancy) change as a consequence of intervention? Furthermore, whether network-based resources are related to adolescents' satisfaction with their educational situation after comprehensive school? Preliminary results indicate that there are differences between experimental and control group related to network content and structure. Furthermore, network-based resources seem to contribute to satisfaction with education after comprehensive school.

The Symbiotic Business Relationship between the Internet and the Sex Industry: Its Impact on the Creation of Global Sex Networks

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Technological advances such as the internet, cell phones and other instant messaging devices facilitate efficient and low cost hook-ups between potential sex partners and between buyers and sellers of sexual services. Numbers of cyber brothels easily accessible through the internet have been increasing remarkably. The internet has also facilitated the mushrooming of so called "sexual networking parties". Due to the combined effect of the internet, increased migration and increased travel, recreational sexual transactions bring together increasingly diverse individuals – thereby creating sexual network ties among increasingly distant (geographically distant) populations. The sex industry has a significant presence on the Internet and the Internet has relied heavily on the sex industry for its growth. The anonymity and privacy afforded to users of the online sex industry has allowed it to boom and help the mainstream Internet industry to achieve growth. In 1995, one in ten businesses on the Web sold pornography and the sex industry was among the top five buyers of state-of-the-art computer equipment in 1999. The online sex industry has linked the commercial success of Internet technology to that of the sex industry – it also links the customers, majority of whom are from western and developed countries – to women and children from less developed countries. Sex tourism, also aided by the internet, creates further sexual links across societies. Effective interconnectedness of local sexual networks creates global sexual networks and potential global sexually transmitted disease epidemics. Recent epidemics of gonorrhea and syphilis among MSM prove this point.

How Do HIV Positives Find Sexual Partners?: Networked Sex and the Internet

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This is the first report from a pilot study examining the lifestyles and experiences of HIV positive heterosexuals. I interviewed selected HIV positive individuals (heterosexuals) about their experiences with the disease. Topics ranged from diagnosis, disclosure, acceptance, treatment and outcomes, sexual life and fertility intentions. This presentation examines the choice of sexual partners from online dating sites, in particular: the factors that facilitate and constrain such choices, avenues for meeting sexual partners, sexual relations, negotiations about risky sex, among others. In conclusion, I discuss theoretical and methodological implications for studies on sexual partnership networks, as well as practical implications for health promotion and related interventions.

The Winnipeg Injection Drug Use Social Network study: the molecular epidemiology of hepatitis C within social networks of injection drug users

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The Winnipeg Social Network Injection Drug Use study is a multi-phase study of injection drug users (IDUs) and their personal risk networks. In this paper, we analyzed the genotypes of HCV found within IDU in Winnipeg to determine whether this molecular data could be used to reveal distinct transmission networks within the larger population of IDU within Winnipeg. The hypothesis being tested is that distinct networks of IDU exist within the larger population of IDU within a given area. These networks would be defined by frequent social interactions within the network, but limited interaction between networks. These behavioural patterns would therefore facilitate intra-network transmission of HCV genotypes, but hinder inter-network transmission. Experimental support for this hypothesis would suggest that molecular data could be used to supplement social data to identify transmission networks amongst IDU. We amplified and sequenced HCV nucleic acid from 139 individuals. We first conducted logistic regression analysis of the distribution of the two most common genotypes found within

the Winnipeg IDU population – genotypes 3a and 1a. Independent variables analyzed included those that would be expected to demarcate networks of IDU (e.g. age; ethnicity; type of drugs used; place of residence and places drugs injected in city). There was evidence that genotype 3a was more common in younger IDU (AOR 1.67[10 year age difference], $p < 0.029$) and in IDU who injected on the street (AOR 3.05, $p < 0.006$). A more detailed phylogenetic analysis at the subgenotype level did not show strong evidence of specific, identifiable transmission networks. Small clusters of people infected with the same type of HCV could be identified, but larger, clearly demarcated transmission networks based on demographic and behavioural variables were not apparent. Overall the data suggested that the IDU population in Winnipeg is relatively homogenous, with some evidence to suggest that genotype 3a may be emerging in IDU youth. We are currently planning to replicate this study in other cities to see if these results will be consistent with those found in other areas and also to determine the extent to which specific genotypes of HCV are restricted to individual cities.

Effects of TND Network on Monthly Substance Use

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Steve Sussman

We report results from an evaluation comparing TND Network with TND and control classrooms on short term changes in monthly substance use. TND Network is a peer led interactive version of TND an evidence based substance abuse prevention program. Curricula and control conditions were randomly assigned to 75 classrooms in 14 continuation (alternative) high schools in southern California. Results showed no main effects for TND or TND Network compared to controls. TND Network reduced tobacco and cocaine use among students who reported more friendship ties to other students in the classroom relative to TND and relative to control students. TND Network was particularly effective on tobacco use for girls with more friends in school. Implications for the delivery of substance abuse prevention programs and for developing network based interventions are discussed.

T1: Computer Networks as Social Networks

A hyperlink network analysis of citizen blogs in South Korean politics

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Citizen participation will probably become more deeply integrated in political environments as digital communication technologies such as the Internet and mobile phone become more embedded in everyday life during the coming decade. In the Asian context, we have seen the strong role of digital media as participatory communication channels not only in high-tech countries such as South Korea, but more significantly, also in technologically less developed nation-states like the Philippines. In particular, the political use of blogs has recently been increasing due to the ability to online-publish quickly and to distribute the uploaded contents to other bloggers. Thus, blogs are simultaneously perceived as personal media and collaborative media. However, the relational aspect of blogs has not been fully discussed. Two analyses are conducted in this study. First, we collected the citizen blogs selected by politicians as their frequently visited blogs. In other words, the study gathered blogs maintained by lay persons, listed on the side bar in the blogs of National Assembly members in South Korea. This case study concentrates on the most popular citizen blogs among politicians. Second, a network analysis of the co-inlinks to citizen blogs is performed and, through this analysis, we attempt to determine whether a relationship exists between the co-inlink and the inter-linkage patterns among citizens.

Email reciprocity and personal communication biases Bernard Hogan

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Danyel Fisher
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Email communication offers researchers a well-codified diary of communication activity. Where email is intensively used, this record can be a useful gateway to overall communication patterns and certain network structures. This paper uses email header data voluntarily collected from employees at a large high-tech corporation to analyze personal dispositions towards reciprocal communication (sending and receiving similar amounts

of email). This paper investigates various dimensions of these personal dispositions. We find strong correlations between the amount of email sent and received between high and medium volume ties, but little correlations between low volume ties. We find that among low volume ties some respondents consistently send more than they receive while others consistently send less. Furthermore, we find little evidence that bias towards sending more or less is related to the number of ties or the overall number of messages. We also examine the structural location of ties (inasmuch as can be inferred from an egocentered analysis). Here we suggest that certain structural properties, such as degree and betweenness centrality play a significant role in determining who is reciprocated or not. This analysis leads us to a pair of related conclusions. Firstly, relations, not individuals, are reciprocal. Individuals have a particular communication bias that is attenuated by some ties towards reciprocity, either because of ego and alter's history of activity or structural location. Secondly, email archive analysis can show aspects of behavior that are present but not always easily codifiable in either surveys or communication diaries, and can capture longer terms than intensive conversation analysis.

Size, Resource Exchange and Sustainability in an Online Social Network

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Online social networks are exempt from traditional constraints related to size, and thus, should be able to support significant social activity. However, while increasing network size provides access to more resources, it can also be detrimental to the processes of converting those resources into benefits. Network size is the key indicator of network resources, and communication activity, consisting of the number of messages posted and the variation in the topics discussed, are measures of how these resources are converted into benefits for members. Butler (2001) suggests that the study of size in online social networks must take into account that there are opposing forces, or logics of opposition (Robey and Boudreau 1999), that serve to simultaneously promote and hinder the sustainability of the network. The purpose of this research is to perform a longitudinal analysis examining size, communication activity and member attraction and retention in one online social network to better understand these logics of opposition.

This research examines three basic research questions. First, how does membership size and communication activity change over time? Second, what occurs during

periods of low membership? Third, what is the rate of member “churn” over time that maintains a sustainable level of resources and communication activities? To address these questions, we utilize a dataset that includes 135,768 messages posted over five years in one online social network by over 5,000 individuals.

The Strength of Internet Ties

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John Horrigan
Pew Internet and American Life Project
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Lee Rainie

What does email do to maintain personal networks and social capital? Our large US national survey finds that email provides what Marshall McLuhan once called “extensions of man” [humankind]. It helps maintain active contact with large networks, it adds on to in-person and phone contact rather than replacing such contact, and it provides information, advice and support for major life decisions. Thus email provides economies of scale for interaction and social capital.

Who does ego-network influence information and communication technologies appropriation?

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It is clear that information and communication technology has an impact on social networks (Katz & Rice, 2002; Katz, Rice et Aspdén, 2001; Korsching, Hipple et Abbott, 2000; Muncer et al. 2000; Muller, 1999; Wellman et al. 2001; Wellman, 1999). But how does a person's ego network affect his or her use and appropriation of ICT? Through a qualitative longitudinal approach we have explored individuals' trajectories through constellations of communicational objects through a series of interviews conducted with newbies, regular users and experts of ICT. Among other things, our research shows that family, friends, colleagues or “others” play different roles at different times in the trajectories of individuals. So, it seems to be with ICT the way it is for social support (Vaux, 1988; Wellman, 1990): people tend to have a “specialised” personal network.

T1: Personal Networks B

The effects of multiplexity of support providers and strong ties' visualization on viewers' perception of personal networks

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In this study, we explore the effects of two ways of visualization on viewers' perceptions of personal networks graphs. Following an experimentation approach, we compare the reactions and interpretations of 173 university students when they receive visual feedback of their personal networks with two types of graphics: the visualization of (a) ‘strong ties’ versus (b) the multiplexity of support providers. We find that viewers generally prefer the social support oriented visualization of their personal networks. The ‘multi-plexity’ graphic allows the detection of key actors, conveys new information, reflects the position of ego in the network and is considered an overall better representation of the personal network. However, the ‘strong ties’ graphic has a positive effect, allowing the detection of clusters and groups in the personal network. Finally, we discuss the utility of this method for exploring, eliciting and validating the respondent's personal network information.

Personal network composition and structure as proxies for acculturation of migrants

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We report on results from a study to develop a personal network measure of acculturation. Over 250 migrants to Spain and 400 migrants to the US were interviewed using EgoNet. Each respondent free-listed 45 alters, provided information about each alter and an evaluation of all 990 alter-alter ties. Respondents also responded to a modified ARSMA II acculturation scale. We report on the relationship of compositional variables (e.g. percent of alters living in their home country) and structural variables (e.g. betweenness centralization) to acculturation scores.

Personal network visualization as a cue for interviewing migrants

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Chris McCarty

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We report on the use of visualizations of 45 alter personal networks of migrants as a cue for interviewing migrants about acculturation. Qualitative interviews with migrants in Spain and the US were recorded as interviewers manipulated network visualizations using EgoNet. Respondents were able to identify the role of ties bridging groups, and on the distribution of compositional characteristics through the network structure. Visualization was found to elicit responses about acculturation that would not have occurred with structural and compositional measures alone.

*Where have you met each other? How meeting places affect personal relationships*Gerald Mollenhorst, Beate Völker, Henk Flap
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In this paper we show that the supply-side and the demand-side perspective on the emergence of relationships provide complementary insights in the way personal relationships are formed. Social settings, places, and institutional arrangements delimit 'the pool' out of which people can choose their friends, partner or acquaintances. Individual preferences subsequently determine how people choose their associates out of the given pool. We therefore first analyze the degree to which different meeting places and other social contexts (like e.g. neighborhoods, work places or voluntary organizations) provide different types of personal relationships, i.e. whether people become friends, marriage partners, or acquaintances. Second, we analyze whether these meeting places also affect relational characteristics, like duration and intensity. Third, following a.o. Coleman (1990), who argued that people's activities more and more take place in 'purposive structures' (e.g. at school, at work, at a club or a voluntary association, at a going out place, or with friends) instead of in 'primordial structures' (e.g. at home, with family, in the neighborhood, or in church), we hypothesize that the places where people's personal relationships emerge will have changed as well. We investigate this a) by comparing personal networks of younger cohorts with those of older cohorts, and b) by comparing personal networks of people living in large cities with those of people living at the countryside (assuming that city dwellers live a more modern life

than countrymen do). Hypotheses are tested using data of the 'Survey of the Social Networks of the Dutch' (SSND) which have been collected in 1999/2000.

Birds of a feather and birds of a tether: Distinguishing homophily and social influence

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One of the central challenges in examining the impact of social networks on their constituent nodes is that the social network is, in part, endogenous. Because people can generally choose with whom they form ties, the direction of the causal arrow involving networks, or indeed whether networks play a role at all, can remain ambiguous. This paper uses longitudinal data to disambiguate the selection effects of tie choice ("birds of a feather") from the social influence consequences of interpersonal ties ("birds of a tether"). Our data set includes longitudinal data tracking the individual values, perspectives, and career goals of a cohort of students progressing through a 2-year masters program, along with full network data for several types of ties assessed near the program's halfway point. Our analysis proceeds in two stages. First, we evaluate the role of different types of homophily (demographic, value, experiential) in tie formation. Second, controlling for these selection effects on tie formation, we estimate the effects of having a tie on the changes in career goals, values, and perspectives. We first find that similarities have different effects on tie formation depending on the type of tie. In other words, not all homophilies have an equal impact on the probability of tie formation. Similarly, although we do find a role for ties in some forms of social influence, they do not always play a role. A cigar can be just a cigar, and a tie can be just a tie.

T1: Inter-Organizational Networks A

How resourceful is a firm? The impact of a firms' resource base on its network strategy in the Dutch insurance industry

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Firms are shifting and improving their network position to achieve a competitive advantage. The implication of this competition for a favorable network position is that a firm may need a network strategy. A network strategy is concerned with how a firm makes its partner selection decisions and what type of network position it desires. While network position is an important determinant of firm performance it implicitly assumes that firms are homogenous in the resources they own. We relax this assumption and take into account that firms differ in their resource base. We address the following research question: "how do differences in the resource base of a firm impact its network strategy"? We study the partner selection decisions by taking a complimentary view: a network position and a resource-based view. We present longitudinal data on the insurance industry network on the relationship resource base, network strategy and firm performance. Our data consists of approximately 4500 firms for the period 2001 – 2005, including tie strength, firm resources and firm performance.

The Organization of Innovation: Integrated versus Core-Periphery Structures in Regional Biotechnology Networks
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BASF AG
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A review of the extant literature reveals that the findings on the structural patterns in high-tech cooperation networks are ambiguous. We examine the exchange of information and knowledge within regional networks in biotechnology by discussing two competing perspectives. While several authors have stressed the paramount importance of cooperation for high-tech companies resulting in dense collaborative network patterns, others have argued that within such networks

a dense core has to be distinguished from a sparse periphery. Based on a thorough discussion of the relevant literature, we derive propositions for both perspectives that more specifically characterize the structural patterns of networks in the biotechnology industry. We analyze the structural properties of a regional interfirm network in the biotechnology industry being located in Southern Germany ("BioNet"). The network consists of 53 companies, comprising small and medium-sized biotech enterprises, universities, private and public research institutions, established major companies, and a series of other companies being related to the biotech industry. Data has been gathered on the emergent information and knowledge exchange between the companies through face-to-face interviews with top executives of all participants of BioNet. To test our propositions, we employ several network analytical measures and techniques including a core-periphery model suggested by Borgatti and Everett (1999).

A social network model to describe the links between departments and to redesign core processes in public administration

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The improvement of public administration implies understanding and improving the links between its departments (units) as major delays and inefficiencies can be caused by such connections. A model based in recent theories of social networks and a specific taxonomy to classify the links between pairs of units is proposed: transferring, informing, advising, enquiring, proposing, prescribing, standardizing, deciding, associating and training. A matrix $(N+1, N+1)$ where N units are studied (plus the input source and the output destination) is estimated describing the main links between any pair (i, j) in terms of taxonomy, frequency and duration (average duration and 10%; 90% quantiles). This model allows the diagnosis of links without significant added value, too long paths, unjustified cycles or serial processes that can be substituted by parallel processes ("concurrent management"). A key area of application of this model is the redesign of core processes of public administration to reduce cost and duration as well as to improve quality. This approach is being applied to improve the Ministry of Environment in Portugal.

The network effect of the relations between social cooperatives and municipalities in a small Italian territory

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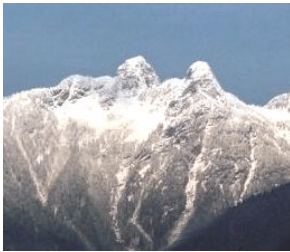
The goal of this research is to analyse the sociocentric networks existing among social cooperatives and those between these kind of non profit organizations and public institutions localized in the city Frosinone, a province of the central part of Italy. Due to the variety of actions realized by non profit organizations, either in Italy or in european and extraeuropean countries, they are likely to collaborate with many public and private organizations. Infact non profit organizations and particularly social cooperatives, have a specific ability in establishing and keeping social and functional relationships not only inside themselves but also outside with other institutional and non institutional subjects. Though a more important characteristic seem to create a special relation between non profit and public institutions, this is their common social goal: the wellbeing of the community. The equivalence of goals between non profit and public institutions makes it possible for them to jointly develop a system of integrations aimed at reaching quantitative and qualitative better results for the public utility. On the basis of this network, if operative relationships exist, either among social cooperatives or between themselves and public institutions, should be useful to figure out the effects on the strategical behavior consequently implemented by those cooperatives.

Collaborating and Competing? On the Dynamics of Value Creation and Value Appropriation in Strategic Alliances

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A broadly supported general finding from inter-firm collaboration research is that organizations involved in collaboration usually achieve above average performance and survival, although with substantial variation in outcomes (Burt, 1983; Owen-Smith & Powell, 2003; Singh & Mitchell, 2005). Explanations for those large variations in outcomes (e.g., structural and resource based approaches) offer conflicting predictions and findings as to their effect on alliance performance (Ahuja, 2000; Bae & Gargiulo, 2004; Burt, 1992; Coleman 1988, 1990; Gulati & Singh, 1998; Hargadon & Sutton, 1997; Stuart, 2000; Walker, Kogut & Shan, 1997). I identify two distinct theoretical dimensions of strategic alliances: collabora-

tion (value creation) and competition (value appropriation) (Burt, 1991; Hamel, Doz, & Prahalad, 1989; Lax & Sebenius, 1986; Teece, 1986). In the literature, these dimensions are combined in the construct of performance and yet often have opposite effects on an organization's ability to derive value from an alliance. By formulating and testing models for these two dimensions of performance I provide an explanation to resolve the conflicting guidance of both the structural and the capability based approaches about alliances effect on performance. For example, network closure may result in value creation within alliances while structural holes may facilitate value appropriation by individual partners. Similarly, partners' resources may predict value creation but differential resource endowments between partners may result in differential value appropriation by individual partners. I test these models on a large longitudinal sample of strategic alliances with sequential cross-nested multilevel techniques.



Thursday Morning Part Two

T2: Visualization A

Two Approaches for Examining Longitudinal Social Networks

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This paper discusses two different approaches to the examination of longitudinal social networks. They are: 1) methods that compare single attributes of the network, such as density or average measures of centrality over time, and 2) methods that examine changes in the global network, i.e., the evolution of the overall patterns of relationship among the nodes. Both approaches are demonstrated using quarterly data on the structure of Canada's inter-provincial migration network at 73 (2nd quarter 1987 to 2nd quarter 2005) points in time, for 13 provinces or territories. The demonstrated is concluded with the visual and acoustic animation of the Canadian network through the application of Jacob's Ladder 1.1.0.

Visualization of regions in a network

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Åsmund Weltzien
Telenor R&D
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We have developed two new methods for presenting a visualization of a network, incorporating both regions and subregions in a single picture. The regions are found by our previously developed topographic analysis method for networks. The first visualization method, the tree method, depends on the steepest ascent graph (SAG) associated with each network region. The SAG, which is a tree structure, is laid out in the plane, and visually the SAG indicates the flow in the direction of increasing eigenvector centrality (EVC) for the network region. The second visualization method, subregion visualization, also starts with the SAG of each network region. A refinement of the network region is performed

by letting each branch of the SAG tree represent a subregion. A new coarse-grained graph is built, where each of the branches are represented as nodes, and the inter-subregion link-strengths are calculated by different metrics.

Visualizing Temporal Social Networks in Context – Adding Content Analysis to TeCFlow

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We have extended TeCFlow [1], a tool for the temporal visualization and analysis of social networks, to visualize content in its temporal context. TeCFlow creates interactive dynamic movies of relationships. It now combines visualization and analysis of the evolution of social networks over time with visualization and analysis of the evolution of semantic networks (concept maps [2]). It shows synchronized changes in central positions of social actors and core concepts over time. The TeCFlow term view analyzes temporal text to identify the leading themes or concepts based on the vector space information retrieval model [3]. It identifies themes by clustering previously unconnected statements and documents. Active relationships between concepts are displayed in a sliding time window, with inactive relationships decaying over time. TeCFlow also calculates and plots the evolution of group betweenness centrality, density, and contribution index of concepts over time to discover changes in interesting concepts in the lifetime of a collection of documents. TeCFlow takes as input structured and unstructured data such as the Web, Google search results, email logs, phone archives, Intranets, and plain documents. It allows, for example, combining tracking the changes in social structures in an e-mail network with visualizing the central concepts discussed in the e-mails. Another application is combining the link structure of Web documents, where changes in the network of Web links are visualized over time, with tracking changes in contents of the Web documents. TeCFlow offers unique capabilities to display and identify unfolding relationships, be they people, words or concepts.

Sociomaps: An implementation of advanced visualization technology to the exploration of large social networks

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We apply two-dimensional, hierarchical- and categorical-data visualization technology to the analysis of large, social network datasets—principally for examining subgroups. We demonstrate an extension of treemap visualization technology as implemented in the ORA statistical software program; we call this a sociomap. A sociomap can be characterized as a graphically-based information and exploration tool which is adapted for use in SNA from technology used in diverse fields such as computer science, finance, and human-gene research. A sociomap represents hierarchical and categorical data in a mosaic form containing embedded, rectangular colored shapes, where, the size and color of each is germane. Sociomap displays are especially helpful when examining data in an interactive mode (as opposed to a static or printed form). We have found that sociomaps are a powerful tool for exploring large social-networks, particularly during the exploratory data analysis phase. Their use quickly leads to a thorough perspective of the holistic characteristics of the network and to easier identification of significant subgroups; both of these perspectives may otherwise remain hidden using traditional visualization techniques. In this presentation, we introduce our implementation of this technology, first broadly, then, specifically how it can be applied to social network analysis. We also show how we have actually applied sociomaps to an interactive study of a large, real- world dataset.

T2: Corporate and Inter-Organizational Networks A

Booking the bazaar: The social structure of exchange in a local cultural market

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Organization Studies
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At nightclubs, talent buyers serve as gatekeepers who link musicians with audiences by deciding what bands will play at their clubs. They also help to buffer organizations from markets characterized by quickly shifting genres, ambiguous performance criteria, uncertain demand and excess supply. Although their functions are often mentioned in studies of art worlds and cultural industries, there have been few formal studies of these critical brokerage roles. I present the results of a multi-year study exploring how nightclub talent buyers use their social networks to manage

complex search and decision making problems. By triangulating among social network, interview and market data, I show that the social structure of exchange in a market for local rock bands varies dramatically across market sectors. Buyers in artistic sectors are embedded in dense information networks with their competitors while buyers in commercial sectors are not. These information networks among talent buyers in turn mirror the aggregate exchange patterns at the market level. Finally, nightclubs that have concentrated exchanges with a small number of suppliers behave competitively with other clubs while nightclubs that exchange with a larger number of diverse suppliers behave cooperatively with other nightclubs. This study suggests that that exchange concentration and cooperation are inversely related when we look simultaneously at relationships among competitors and relationships between buyers and sellers.

The Structural Dynamic of Auditor Switching

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Previous research on interfirm networks has examined the dissolution and formation of interfirm ties as independent events. This study examines the breaking and making of ties as dependent processes shaped by the structural context in which a firm is located. In the context of the audit services industry, I examine an almost complete population of 75,452 client firm-auditor pairs over a 16-year period. I find that the likelihood of a firm switching in the following year depends on the extent to which a firm and its competitors retain the same auditor, i.e., the extent of 'crowding.' The relationship between crowding and switching is curvilinear, with declines in the likelihood of switching occurring at the lowest and highest levels. There is also a significant association between a relative decrease in crowding and a firm having switched auditors. The affect of crowding on switching strengthens in periods following the consolidation of the big audit firms. Thus, the structural context in which a firm is lo-cated shapes the decision to both break and make audit ties. In the aggregate, this process sheds light on the question of why eight big audit firms dominated the market and now four. The findings contribute to understandings of the relationship between structure and ac-tion, the patterns of 'who is tied to whom' in the marketplace, and how interfirm dynamics shape market structure.

Which ties matter? Understanding clients' perspectives on external professional service provision

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Aberdeen Business School
The Robert Gordon University Garthdee II,
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Professionals rely on their networks of relationships to deliver value in their professional services to clients.

Whereas much of the literature on professional service firms has tended to concentrate on the investigation of intra-professional firm networks (e.g. Lazega, 1999, 2001; Nelson, 1988; Sandefur et al., 1999), our focus is on client-professional networks examining the importance of the ties as perceived by clients when selecting external professional service providers. Our interviews with large Australian client organizations of law firms reveal that clients select their external providers using both strong ties and weak ties. Strong ties are reflected in the historical relationship between the professional service firm and the client organization. Most clients see a positive, long-term relationship with their external service providers as a way of not 'reinventing the wheel', thereby ultimately saving their costs and time. Whereas strong ties are essential in maintaining future business opportunities with the same client, professionals can also gain various information benefits through their weak ties in terms of having clients in unrelated fields or clients who are not connected to each other. Interestingly, the role of weak ties is evidently important to client organizations. Clients use the weak ties of their network contacts for recommendations to identify a profile of reputable firms before engaging their services. These weak ties are becoming increasingly significant as strong ties are slowly dissolving when client organizations internationalize their business. The results of the study provide strong implications that the two types of tie are used by clients in different contexts. It is proposed that professional service firms that are aware of the conditions of the different types of tie are the ones more likely to maintain their existing client base and attract new ones.

*Instrumental Rationality or Embeddedness:
Tie Formation and Renewal between
Limited Partners and Venture Capital Firms*

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Why do buyers and sellers form and renew their transacting ties? The answer from sociologists is likely to be embeddedness. However, few literature ever talked about the influence of supply and demand of potential transaction partners on tie reproduction. Availability of more buyers and sellers may reduce the odds of tie renewal and, thereby, compromise the influence of the embeddedness. The effects of embeddedness are contingent upon the institutional and ecological environments. Using the SDC (Securities Data Company) Platinum data from the Thomson Corporation, I explore the factors affecting the formation and renewal of ties between limited partners and venture capital firms in the 1990s.

T2: Adolescent Friendship Networks A

Determinants of gender composition and structure of peer groups in a community

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Individual children and teenagers usually select peers of their own gender. The dyadic peer ties they form link them into peer groups. Recent research suggests that the teenagers' peer groups differ in gender composition and structure (Kirke, 2006). Most peer groups are single gender and the structure of peer ties in them appear to differ, with males forming larger, more dense structures than females. This paper examines an extended dataset of all peers named by a complete network of teenagers to explore whether there is further evidence of differences in gender composition and structure. Since opportunities and constraints on social contact within the community would have affected the peer groups formed, this paper examines how the teenagers' age, sibling ties, location of family home in the community and the schools attended by the teenagers may have affected the gender composition and structure of the peer groups formed by them.

Transitivity, Intersecting Parameters, & Intergroup Relations

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In Blau's simple theorems of segregation and integration (1977), intergroup relations along one parameter are promoted or discouraged by the degree to which group memberships (or rankings) along different parameters correspond (i.e. racial groups, religious congregations, occupations, neighborhoods, etc), such that intersecting parameters promote intergroup relations, and consolidating parameters discourage it. But this focuses on ties that the divisions of society structurally induce through directly exposing people to one another, and does not account for ties structurally induced by network processes, such as transitive closure. The existence of transitivity in interpersonal networks significantly complicates Blau's theorems: transitivity should augment the effect of intersecting parameters well beyond what baseline models derived from Blau would have us expect, and conversely, heighten the segregation effects of consolidating parameters. I analyze a mathematical network model to elucidate the relationship between transitivity, the intersection of parameters, and intergroup relations. I also look how this relates to choice-homophily bias, and examine data of adolescent friendship networks (from Add Health) for some empirical grounding.

Dynamics of friendship and behavior in early adolescence

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Network autocorrelation is found for different characteristics among early adolescents. In our study, we investigate the relative importance of selection and influence processes as causes for similarity among adolescent friends. We examine three topics that might be of interest for young people: alcohol consumption, delinquency, and opinion about school. Due to data and methodological restrictions a comparative study for selection and influence processes based on different kinds of behavior was not feasible until recently. Our study uses complete longitudinal sociometric and behavioral data (four waves) from 3,017 students (12-13 years of age) in 120 first grades in Dutch secondary schools. We employ the longitudinal network-modeling program SIENA to disentangle the feedback of friendship and behavior. Results will be presented.

T2: Collecting Network Data B

One in Four Is Enough – Strategies for Selecting Ego Mailboxes for a Group Network View

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eBusiness Management School - ISUFI,
Lecce, ITALY
Peter Gloor
MIT CCS

Robert Laubacher

Recently, researchers have started analyzing e-mail archives of individuals and groups as an approximation of social ties. It can be hard to obtain complete e-mail archives covering all exchanges between a group of individuals. Frequently, only e-mailboxes of a subset of the analyzed actors are available for analysis. In this project we report on some experiments to find the best ego networks (i.e. mailboxes) to give a “reasonably” complete picture of the full social group network. We also report on the stability of social network metrics with respect to incomplete networks. We have collected the complete individual mailboxes over a period of 20 weeks of 53 researchers working in the same lab, collaborating on different (research and formative) projects. We have done a series of simulations to identify the best strategies and metrics for analysis of incomplete e-mail networks. Applying snowball sampling and subsequently adding more members of the group, we have compared a globally optimal selection strategy, adding the next-best member with respect to the chosen metric, a locally best strategy, adding the next best member within the already known network, and a random selection strategy. As sampling metrics, we used individual

and group betweenness centrality, group density, number of nodes and edges, and others. We have categorized ego networks by roles of individual actors as lab manager, project and subproject managers and project contributors. Lab managers and project managers are in the core, individual contributors are in the periphery of the group network. Results show that good approximations of group network structures are already obtained with 25% to 30% of the mailboxes of the community.

Dual Frame Sample Surveys as a tool for Analyzing Community Structures

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Surveying rare populations using Random Digit Dialing (RDD) is extremely expensive. Dual frame studies that combine organization lists in a local area with an RDD sample are an affordable alternative method that generates a probability sample. The overlap of names on organization lists, normally discarded in the process of building the sample, also provides a means for analyzing relationships between organizations in the community. We report on a study of the Jewish population of Boston that utilized 86 different organizations to build the organization derived frame. Overlaps are analyzed both in terms of connections between the organizations as well as the structural similarities between organizations that have common relations to other organizations. Challenges to network clustering theories are discussed. The result is an understanding of community structure unavailable through any other means.

Network Genie: An Online Strategy for Designing Social Network Surveys and Collecting Social Network Data

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Cheryl Wyrick

Network Genie is a web application that allows researchers to design and manage social network research projects. Researchers can create surveys that assess both person-centered (information about the respondent) and network-centered data. Multiple types of network-centered data can be collected including the definition of subgroups, ratings, rankings and nominations of network members, and perceptions of relationships among network members. The application supports both complete and ego-centric network projects. Data are collected through online surveys. Data can be exported as a comma-separated-variable (CSV) file or to meet the specifications of four common social network analysis programs (KliqueFinder, MultiNet, NEGOPY, and UCINet).

T2: Complexity

Complex Networks: A Simulation Study

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Complex systems have been a hot topic in the physical sciences for a number of years. This development has been animated by the possibility of discovering properties of all complex systems that transcend any particular substantive area. Social science applications have been rare and confined mostly to economics. To my knowledge, no social network use has been made of the tools and concepts developed to analyze complex systems. The most general characterization of complex systems is that they involve systems of interacting units that are undergoing a phase transition in their structure. One indicator of the existence of a complex system is that it generates a power-law distribution. Computer simulations of earthquakes, avalanches, and species extinction rates in complex ecologies have generated results consistent with known power-law distributions. Yet, a power-law distribution is not an invariable sign of an underlying complex system. Scale-free networks, for example, although they have power-law distributions of degree, are not complex systems. Random networks undergo a phase transition as the average degree passes through one. The relative size of the largest connected component discontinuously changes from near zero to a significant proportion of the network. In the simulations described in this paper the stress (and probability of failure) for individual links in a growing network are proportion to the link's betweenness centrality; central links carry more information in the network and are more likely to be overloaded. However, the breaking of a very central link can have catastrophic effects on the network, for example, by dramatically reducing the size of the largest component. This is the complex phenomenon that will be examined in simulations.

The Emergence of Social Networks: Upward, Downward and Iterative Social Pattern Formation Processes

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ICT&S Center,
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Salzburg Austria

Jeanette Voas

The aim of this paper is to explore theoretical perspectives of social pattern formation as upward, downward and iterative causation processes: how social networks

and structures develop as a result of individual interactions and how the system in turn influences the interactions of the individuals in a never-ending iterative process. We borrow concepts from complexity science and compare and contrast these with established sociological, political, and general systems theories in explicating these emergent, iterative processes of pattern formation in social systems, including the feedback loops that influence or even dominate social actors. We further illustrate these theoretical concepts with the empirical case study of health systems integration in the U.S. and the U.K. The paper is organized as follows: we begin with an overview of definitions of terms regarding social pattern formation from complexity science perspectives. We then give a brief introduction to the phenomenon of multi-level health systems integration in the U.S. and the U.K. based on a prior review of the empirical studies on this topic, as a background against which the utility of complexity sciences concepts of social pattern formation could be compared and contrasted with other established sociological and political science theories. We structure our discussions on pattern formation in terms of upward causation, downward causation, and iterative processes. We conclude with a note on the implications of these theoretical perspectives for future network and social systems research.

Using Network Analysis for Effectively Placing Gate in a Semi-Opened Electronic Ticketing System in Railway Networks

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A seamless electronic ticketing and fare collection system is going to be rolled out by the end of 2008 for the complete public transport system throughout the Netherlands, providing travellers with increased convenience. However, given the present capital investment, only a proportion of the total number of stations could be installed with the electronic gate at the initial phase, resulting in a semi-opened system. Currently, Netherlands Railways faces two major challenges: selecting the "right" stations to install the gates and identifying the "waterbed stations" (open stations that could be used by the "black riders" because of the closing of the nearby stations). "Black riders" are the persons who use the public transport service but do not pay for the (complete) fare. There are two main reasons to install gates at a particular station: first, to speed up the passenger flow and provide ease of use; and second, to put a compulsory checking point along the passengers' journey in order to keep the "black riders" out of the transport system. As the first attempt, this article 1) adopts the network analysis method to identify both gated and waterbed stations in the entire Dutch railway network; 2) proposes a number of operational strategies to effectively control the "black riders" in the semi-opened

ticketing / gating system; and furthermore, 3) makes a theoretical contribution to explore the link between network structure and performance of the network. By using the proposed guidelines, the public transport operators could achieve a significant reduction in the number of "black riders", avoid the loss of income, and moreover to leverage their infrastructure capital investment.

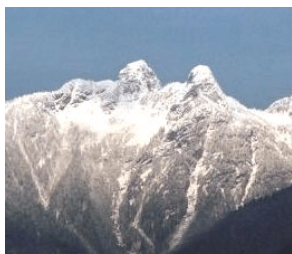
Newtonian Mechanics of Social Networks

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Most theories for social network formation make predictions of micro-level decision processes of individuals based on macro-level patterns observed in empirical networks. In this work we attempt to reverse this process, establishing coherent mechanics of network formation based on Newton's Laws using a multi-agent simulation. Working within the social network frame of analysis, individual-level processes such as the need for socialization, the need to preserve strong family ties, and the need to be informed strengthen individual network ties. At the same time, a number of other processes such as the need to minimize cognitive pressures and the need to establish power over other individuals act as counter-forces that repel network nodes. Applying Newton's three

Laws to social relationships, we can infer that specific social processes act similar to forces bringing people closer together or push them apart. Newton's 1st and 2nd laws dictate that change does not happen instantly, and the motion of nodes (i.e. strengthening and weakening of edges) is subject to the relative force and inertia. Newton's 3rd law states that for every force there is an equal and opposite force -- thus for every force or social process moving nodes of the network closer together, an opposite force will exist pushing nodes apart. Thus, we can view structural properties of nodes as a mechanical balance of forces acting upon the nodes. Sometimes a stable state of such system may be reachable, but most of the time a combination of forces will produce a continuously evolving or oscillating system. Thus, we present a constructionist multi-theoretical model of Newtonian network mechanics to demonstrate that such a model can be parameterized to produce a multitude of network and organizational forms, from dense family patterns of early societies to widely distributed polities of the modern age.



Thursday Afternoon Part One

T3: Gender and Social Capital

Tipping points: Referral homophily and job segregation

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Homophily is often invoked in discussions of the segregating effects of informal recruitment using employee referrals. The details of the relationship between homophily and job segregation however, largely remain unexamined. A review of how homophily is conceptual-

ized in the job segregation literature reveals two distinct perspectives on homophily. The first, absolute homophily, is an overall level of homophily pervading job search networks that is both external to and independent of the characteristics of hiring organizations. The second, relative homophily, varies with each job, and introduces job-specific gender asymmetries to traditional conceptualizations of homophily. We develop a mathematical model to explore the role of both homophily types in job segregation. We find the surprising result that any less-than-perfect level of absolute homophily tends toward job integration, never segregation. Relative homophily, with its gender asymmetries, can lead to segregation. Including empirically-supported asymmetries in

referring behavior has the potential to exacerbate, neutralize, or counteract the segregating dynamic of relative homophily. Thus it is not merely homophily, but asymmetries in homophily and referring behavior that lead to job segregation. Further, organizational policies affecting the behavior of referrers within the firm can tip the balance to determine whether referring serves as a segregating or integrating force.

How Occupational Characteristics Influence the Importance of Qualifications and Gender in the Flow of Job Information from Weak Ties

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In this paper I examine how the flow of job information through social networks is affected by the characteristics of the occupation in which the job is situated. Much research on the use of social capital in job searches has focussed on determining which network members and which network structures are likely to contain the most job information. However, the transfer of job information is not the inevitable result of the availability of information within the job seekers network. It requires not only that network members have information, but that they identify the job-seeker as potentially interested in this information. In this paper I test hypotheses derived by considering the conditions under which network members are likely identify a job-seekers as potentially interested in particular job openings. I distinguish between jobs in (A) closed labour markets, in which qualifications and jobs are tightly linked and particular backgrounds lead predominantly into particular occupations (such as the professions or trades); and (B) open labour markets in which jobs draw on a variety of backgrounds and potential applicants are qualified for a variety of careers (such as sales or consulting). I argue that information holders dealing with weak ties who are potential job applicants cannot draw on in-depth knowledge of the potential applicants' career goals when gauging their likely interest in specific jobs. Therefore, they can identify potential job applicants among their weak ties only when these weak ties clearly signal the occupations in which they are interested. Using data from the National Longitudinal Survey of Youth, I examine how the availability of such signals, in the form of education and employment background and gender, affect job-seekers ability to mobilize ties of different strengths. I hypothesize and show that job in open labour markets rely less on their weak ties – who may not know what kinds of job information to pass along – than job seekers in closed labour markets, whose training clearly and obviously signals their area of interest. However, for female job seekers in open labour markets, gender can serve as an alternative signal. Women whose education and backgrounds do not prepare them for a specific occupation can still rely on weak ties in female-dominate occupations. Conclusions focus on considering the importance of labour-market variations in

the use of social capital, and in the role of variations in social capital on the maintenance of inequality.

The downside of social capital: examining the crab syndrome

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Women's lack of involvement in decision-making, particularly in areas that are important, reflect a covert form of gender inequality in Western society. A growing body of evidence supports a structural perspective to explain gender differences in career achievement. Informal social networks (as opposed to the formal managerial chart) receive particular interest as powerful tools for creating opportunities for career development and intra-organizational mobility. So far, much attention is drawn to the positive impact of social relations, generally referred to as the social capital of networks. In the present study we distinguish various work relationships as we examine the negative impact of social relations. In particular, we investigated the crab syndrome hypothesis which argues that men tend to support each other on their way "to the top" whereas women tend to "take each other down" like crabs in a basket. Previous findings of our study (N = 401) showed that the gender gap in decision-making is particularly persistent in work areas that have impact for organizations. Results further revealed that women's arrears in decision-making authority at work was not accounted for by deficiencies in human capital. However, the gender gap was partly explained by (a) a relative lack of returns to women's human capital, (b) inhibiting resources from informal networks, and (c) inhibiting close and strong expressive ties. On the basis of these results we examined the down side of work relations to members of the same sex to account for the gender gap in workplace authority. Findings will be discussed.

T3: Adolescent Friendship Networks B

Social-capital Effects on Adolescent Dating Norms

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Despite the burgeoning scholarship examining peer influences on adolescent sexual behavior and longstanding recognition of how social networks affect intimate/ conjugal roles, relatively little attention is known about the impact of peer networks on adolescent dating norms. Thus, we seek to address the following question: what network mechanisms facilitate an adolescent's adoption of dating norms? This research examines the effects of social capital, in terms of brokerage and closure (or density), on dating norms of the courtship process, which involve the sequencing of social, dyadic, and sexual events. We em-

ploy Gould and Fernandez's brokerage measures to test how different brokerage roles, defined by the structure of ties among male peers and female peers and between males and females. We apply this framework to data drawn from Wave I of the National Longitudinal Study of Adolescent Health (1994- 1996) and employ rank-ordered logit models to examine the sequencing of sexual activity in adolescent dating. Initial results indicate that peer network density and delinquency are significant for the sequencing of actual dating relationships.

Multiple methods for measuring peer influence and peer selection for adolescent smoking

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Despite advances in tobacco control, adolescent smoking remains a problem. The smoking status of friends is one of the highest correlates of adolescent smoking. Homophily, the tendency for people to associate with others like themselves, creates a high correlation between smoking and friend smoking. This series of studies attempted to assess whether peer pressure, where adolescents adopt the smoking behaviors of their friends, or peer selection, where adolescents choose friends based on their smoking status, or both, are occurring in a sample of adolescents.

These studies used longitudinal data from Waves 1 and 2 of the Adolescent Health (Add Health) dataset: the Study 1 population consisted of all adolescents with complete data at both time points, the Study 2 population was those adolescents from schools from the social network subset of the study, and the Study 3 population was adolescents from those schools with social network information with school network sizes under 500. In Studies 1 and 2 structural equation modeling was used to test a model of peer influence and selection on adolescent smoking, to test whether different models exist by gender and ethnicity, and to test models for each gender and ethnic subgroup as warranted.

The first study, using the adolescent's assessment of the number of friends who smoke, found that both peer influence and peer selection were occurring for the entire model. Peer influence was stronger for Whites than for the other ethnic groups, as predicted. Results for the second study, where friends' smoking was measured as the proportion of an adolescent's friends who were smokers at each time point, were less conclusive. There

was no model that led to a good fit for the whole population, but good model fits were obtained for each gender and each ethnic group. The final study was valuable in that it allowed for examining influence and selection at the network level, rather than at the level of processes involving the individual. This study found evidence for peer selection but not for peer influence.

Influence processes in social drinking: Observations of modelling and persuasion in young adult peer groups

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Ronald Knibbe
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Wim Meeus

Social influence concerning alcohol consumption is often studied by means of questionnaires. A problem with the application of questionnaire data in the study of short-term influence processes (like those occurring in social drinking situations), is that they provide information about the outcomes of influence processes, but are not very effective in disentangling the operation of the processes themselves. In an attempt to meet this problem, we studied video recordings of 30 peer groups (N = 238) in an ad lib drinking situation. We coded these observations on drinking behaviour and the way drinks were ordered. We combined these data with questionnaire data on sociometric peer group nominations on several aspects (e.g. preference, leadership, dominance, conformism) possibly relevant to peer influence. We hypothesized that these aspects may differentiate between the intensity and effects of modelling that occurs between individuals within a group, i.e. the amount of imitation occurring between peer group members. Furthermore, we expected an effect of sociometric status aspects on the intensity and effects of persuasion, i.e. the amount of alcoholic consumptions being offered, the amount of consumptions being accepted from individuals and by individuals. We used multilevel analyses to apply actor-partner interdependence models to answer our research questions.

T3: Inter-Organizational Networks B

Social capital of healthcare agencies
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Burt (1997a) proposes that social capital is contingent on the position a node occupies in a network: a node connected with less similar others – that are further connected with nodes similar to them – will increase its chances of gaining novel information and opportunities

of succeeding in its work. Burt sees social capital as a function of being a bridge in a network and filling structural holes. We report on a study that traces inter-organizational ties within CHC, a coalition of agencies working together to increase access to health care for uninsured, economically-disadvantaged and underserved populations in Los Angeles County. Data results will be presented and discussed for their implications for network claims of social capital in nonprofit work.

Watched by Many: How Legitimacy Concerns Drive HIV/AIDS Activist NGOs' Linkage Decisions

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Annenberg School for Communication,
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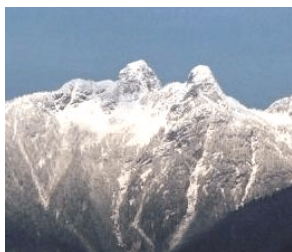
The international network of non-governmental organizations (NGOs) and governmental organizations (IGOs) involved in battling the HIV/AIDS epidemic has been experiencing steady growth. Viewed from a resource dependence perspective (Pfeffer & Salancik, 1978), these NGOs are assumed to strategically engage in relationships with other organizations that are conducive to their survival in a finite resource space. Four HIV/AIDS organizational forms can be differentiated: Activist, service, membership, and research organizations (Shumate, Fulk, & Monge, 2005). While the first type of NGOs assumes a challenging position towards governmental bodies and legal institutions in its struggle for achieving human rights issues of the HIV/AIDS epidemic, the latter three work within the existing political status quo. Thus, the needs for organizational legitimation differ between activist and non-activist NGOs. Expected to maintain their antagonistic status towards IGOs and avoid cooptation by government officials, activist NGOs incur high costs when they link to IGOs because such connections may be viewed as inappropriate behavior by their constituencies. This means that activist NGOs have to carefully balance potentially damaging effects of links to IGOs on their legitimacy with their advantages, which may come in the form of governmental funds and institutional support. These specific legitimation concerns can be detected when the development of the whole network is examined. Based on a stochastic actor-oriented model (Snijders, 1996) as implemented in the

software SIENA, an analysis of the evolution of the HIV/AIDS network from 1995- 2001 provides insights into these linking decisions of activist NGOs.

Structural and organizational factors that inhibit or facilitate knowledge transfer in networks

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The Dutch Mental Healthcare constitutes a network of about 500 organizations. The rationale behind the network is an intensive exchange of knowledge and information. Every organization has its own need for knowledge as well as creates knowledge that is transferred to other organizations within the network. In order to operate as an efficient and effective network, the knowledge exchange should match the specific needs of the constituent organizations. However, several evaluations indicated that this matching is far from proficient. In this study it is assumed that the effectiveness and efficiency of the network is strongly influenced by network characteristics and individual characteristics of the organizations. In the conceptual model we distinguish organizational factors (i.e., nodal view (Gupta et al., 2000)) and structural factors (i.e., system view (Gupta et al., 2000)) that facilitate or inhibit the knowledge transfer. The structural factors in the model are organizational distance and the flexibility of the network; the organizational factors are the amount of social capital in an organization and the knowledge infrastructure within an organization. Data collection was conducted in two rounds, in 31 and 24 organizations respectively. In the first round focus was on organizations in their role as senders, while the second round their role as receivers of knowledge was prime object of study. The results implicate the relevance of both the structural factors and the organizational factors for the effectiveness and efficiency of the network. The scientific results showed to be applicable in managerial practice.



Thursday Afternoon Part Two

T4: Methods

Triad census statistics for a random graph model

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In this presentation, we would like to show how the Pólya Enumeration Theorem (PET) can be applied for constructing a random graph model, e.g., the positive transitivity mode. By applying the PET, we can obtain the isomorphic classes used to calculate variances and covariances of triads. In social networks research, various random graph models have played significant roles in analyzing data based on interpersonal relationships. For instance, in the positive transitivity model by Holland & Reinhardt (1970), the basic unit of analysis is a triad. In order to express transitivity, a directed graph with three points and directed lines are employed in the model. Furthermore, the statistics of transitive triads is used to investigate large data sets. Various generalized and extended models of this type were constructed in the past (Wasserman 1977, Kishida 1990), but for almost all these models, it is crucial to identify isomorphic classes of certain types of triad and its combinations. The PET is widely used to determine isomorphic classes in many combinatorial structures. We apply a generalization of the PET to signed digraphs (Harary and Palmer, 1973). That is, a signed digraph with three points, and a signed digraph with four points to determine the number of their unlabeled ones first. Then we obtain their labeled signed digraphs.

Very Local Structure in Social Networks

Katherine Faust
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Triadic configurations have been at the heart of theoretical and methodological advances in social networks for nearly half a century. Triads are implicated in many of social networks' theoretical sacred cows – structural balance, transitivity, random and biased nets, the linkage

between micro network properties and macro social structures, the strength of weak ties, structural holes, and network closure, to name a few. Triads and properties of triples also provide the basis for important social network methodologies – the triad census, relational algebras, and structural effects in many exponential random graph models, for example. In this talk I replicate and extend my earlier results demonstrating that triad censuses for a wide range of social networks are largely accounted for by network density and dyadic distributions, properties more local than triads. The current talk presents results for a collection of 82 social networks, representing a number of different species (humans, baboons, macaques, bison, cattle, goats, sparrows, caribou, and more) and a variety of social relations (friendship, negative sentiments, choice of work partners, advice seeking, reported social interactions, victories in agonistic encounters, dominance, and affiliation). Results show that more than 90% of variation in triad censuses for these networks is accounted for their by dyad distributions and that these empirical triad censuses are essentially indistinguishable from what is expected given their dyad distributions.

Eigensysteme Analysis of a mobile phone data set

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Information Services and Electronic Markets,
Geb 20.20 (RZ), Karlsruhe,
Baden-Wuerttemberg, Germany

The Eigensystemanalysis of complex Hermitian adjacency matrices yields a good understanding of the substructure of a group based on its communication behavior. In addition, when the point of time of communication and communication contacts are built into one adjacency matrix the resulting eigensystem reveals information not only about the structure of the communication contacts, but also about the time these contacts take place in discrete time. As an example part of Reality Mining data set has been analyzed with these questions in mind. As a result we did not only find the component wise structure of the underlying group of people given by their calls and SMS, but also the time behavior of the relevant subgroups.

Negative Networks: Cluster and Divide

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Traditionally, network analysis focuses on positive relations. As pointed out, e.g., by Borgatti and Everett (Sunbelt 2004), negative relations require different methods of analysis, since, e.g., transitivity is no longer reasonable to assume. In this talk we present a method that, given a network of negative relations, identifies clusters of conflict and divides their members into opposing groups. It is particularly convenient, that unimportant actors are filtered out in the process. The method is based on spectral properties of the network and proves to be stable with respect to noise in the input data. We use data from the Kansas Event Data System (KEDS), a semi-automatic coding system for news reports, to illustrate our method on hostile actions in the Persian Gulf and on the Balkan. The results are significantly improved with respect to last year's Vizards Session.

Bridges and Potential Bridges: Changing Links to Find Critical Paths and Nodes in a Network

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This paper proposes a measure called bridges derived from Granovetter's strength of weak ties insight that network ties which reduce overall distances in a network are important structural bridges. We calculate bridges by systematically deleting existing links and adding non-existent links and summing the resultant changes in the network's average path length. We demonstrate bridge calculation on hypothetical networks, and create a database of 100 simulated networks to show how the bridge measure correlates with existing networks measures such as reciprocity, density, constraint, closeness centrality, and betweenness centrality. We then show how the bridge measure can be used to address a substantive research question with data on friendship networks in middle schools by showing that being a bridge is associated with cross gender ties (boys having girl friends or girls having boy friends). Bridges and the accompanying methodology provide new network measures useful for studying network structure, network dynamics, and network effects on substantive behavioral phenomenon.

*T4: Corporate and Inter-Organizational Networks B**Social Diffusion of Business Strategy: Mimetic and Collaborative Processes in Business Decisions to Expand Overseas*

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While business strategy is generally conceived in atomistic and purposive terms, Mintzberg's (1978) pioneering identification of much of business strategy as an emergent process has opened the door to analysis of the social embeddedness of strategic decision-making. The adoption of numerous business practices from capital funding to executive compensation have been analysed as part of a process of social diffusion among firms. Network analytic techniques hold the promise of rigorous consideration of the diffusion of business strategy more broadly conceived, thereby providing robust content to the notion of emergent strategy. This paper takes some steps towards this challenge, utilising network analytic techniques to examine the diffusion of business strategy among a group of large firms over a prolonged period. Sensitive to Mizruchi and Fein's (1999) observation that most diffusion studies assume a mimetic process at work, two explicit models of diffusion are tested, one a mimetic process and the other a process of collaborative development. The data set comprises the internationalisation decisions by large New Zealand firms over a thirty year period from 1972, a period encompassing a structural break. The adoption and abandonment of internationalisation as a business strategy by these firms at different times is compared to the evolving social network among the firms forged by interlocking directors and shared business advisors. Mimetic effects are found to outweigh collaborative effects.

Reputation and Organizational Foundings: Evidence from Tsarist Russia, 1700-1914

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A central question in the study of organizational behavior is how reputation shapes organizational performance. How does past performance of corporations influence the success of their founders in winning potential investors for future ventures? We consider reputation in terms of revealed preferences of investors to back new corporate foundings. While previous studies suggest that excessive failures will have a clear negative reputation effect, this paper documents how this effect varies systematically with structural positioning within

inter-organizational networks. Using a unique data set on over 4,500 corporations and 14,000 founders in Tsarist Russia over a period of more than two hundred years (1700- 1914), we reconstruct the joint affiliation ties among corporations in this period. We then consider the performance of organizations across different network clusters, taking regional differences, industry composition as well as ethnic discrimination as a barrier to entrepreneurship into account. The evidence suggests that even individual entrepreneurs with known records of failure secure initial capital for new ventures as long as they stay in the same cluster. However, high aggregate failure rates within clusters lead investors to prefer founders venturing into different clusters. In these cases, an entrepreneur's record of success does matter as a signal for attracting investors and positively affects the amount of initial capital raised.

*World Corporate Network:
Interlocking directorates around the world*

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Through the study of the intercorporate relations by interlocking directorates in 2004 I try to answer two questions. First, if a transnational economic power exists, that's to say, is there a set of corporations with transnational dynamic, relationships between the greatest and most important companies in the world. Second, if the intercorporate system is based on the financial power (banks and the insurances companies). The results show the existence of a large transnational economic power where elites are related around North Atlantic, as well as, a collective banking power that dominates the intercorporate system. Furthermore, I distinguish three models of transnational corporations according to its national networks: the French-German model of high international presence and compact and cohesive national corporate network. The Anglo-Saxon model has international presence and low compact national network. The Japanese model has neither transnational corporations nor cohesive corporate network.

The Diffusion of Enterprise Resource Planning: A Network Epidemiology Perspective

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Empirical observations in key sectors such as the pharmaceutical, aerospace, and oil and gas industries suggests that Enterprise Resource Planning (ERP) vendors that successfully build a significant critical mass of users

within an industrial sector generally benefit from an increased adoption rate of their products. From an epidemiological perspective, the decision to adopt an ERP system appears to exhibit what could be referred to as a "contagious" propensity. Although diffusion theory has recognized such propagation behaviour in other software innovation segments, no model explicitly quantifies this pattern. Building on recent advances in network epidemiology, we intend to analyse how the decision to adopt industrial technologies propagates within an industrial network. Preliminary evidence from the business network of Canadian public firms shows that the network proximity of a least one large adopter of the dominant technology is a significant predictor of the adoption decision.

Immigrants and the Job Search: Comparing the Internet and Social Networks

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It has been well documented that most people search for jobs and employers find applicants through social networks. This finding, publicized in the classic study by Granovetter for people in technical jobs in the US, has been widely replicated. Most research has been conducted on people that had developed rich social networks. By implication, they had lived in a place a long time. They also participate in an institutional structure leading them from higher education and into careers that follow familiar paths. The institutional structure is their cultural capital. People who are new migrants arriving in the skilled classification, do not have these cultural and social assets.

Our research shows how recent skilled immigrants from PR China to Canada get their current job. These new immigrants know few people in their fields. A few arrive with networks to Canadian firms, some have networks connecting them to friends and kin already living in Canada, and most start building new networks on arrival. Most of their networks reach into the ethnic enclave where they find jobs for unskilled labor. Since finding a good job through networks is problematic, in the end many use the internet as a resource to get jobs. One of our questions is: does the internet provide access to better jobs than when they use social capital? Our study consists of an on-line survey of 303 new PRC immigrants to Canada entering in the category of skilled workers; a follow up in-depth interviews of 28 of those surveyed.

T4: Infectious Diseases and Social Networks B

Comparison of networks resulting from respondent driven sampling and a social network inventory

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We will present data collected in Raleigh and Durham, NC as part of the Sexual Acquisition and Transmission of HIV Cooperative Agreement Program (SATH- CAP). The goal of the study is to better understand the dynamic behavioral, biological, and environmental processes implicated in the sexual transmission of HIV and other sexually transmitted infections among drug users and the diffusion of infections from drug using populations to non-drug using populations. The study employs a respondent-driven sampling technique. This approach builds a sample by allowing each study participant to recruit into the study up to seven individuals, then for each of these individuals to recruit up to seven individuals, and so on in turn. Eligible recruits include either sex partners of the individual who recruited them or MSM or active users of one of several hard drugs. The data allows for a dendritic or tree-shaped graph of connections between study participants. Missing, however, are any connections that may exist between these individuals aside from the relationships between recruiters and their respective recruits. We will compare the network information gained from RDS to network information collected using a separate personal network inventory, which asks study participants to enumerate all of the individuals with whom they have close contact, including but not limited to sexual and drug-using contacts. Similarities and differences in the revealed networks will be explored and pros and cons of each data collection technique will be discussed.

Spreading on Networks

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We apply our previously developed method of “topographic” analysis of networks to the problem of information (“epidemic”) spreading on social networks. We consider the simplest form of epidemic spreading, namely the “SI” model (which is roughly appropriate to gossip and innovation spreading). We argue that the eigenvector centrality of a node is a good indicator of that node’s

spreading power. From this we develop seven specific predictions for the progress of the ‘infection’. In particular, we predict that each region (as defined by our approach) will have its own S curve for cumulative adoption over time, and we describe the various phases of the S curve in terms of motion of the infection over the region. Our predictions are well supported by simulations on several empirically measured social networks (peer-to-peer graphs and collaboration graphs). In particular, the significance of regions to epidemic spreading is clear. Finally, we develop a mathematical theory, giving partial support to our picture. The theory includes a precise quantitative definition of the spreading power of a node, and some approximate analytical results for epidemic spreading.

Connectivity, Density, and Diffusion: Low degree networks can be as effective as scale free

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Over the past two decades, the epidemic of HIV has challenged the network community to rethink the impact of network structure on diffusion. While density would seem to be the most relevant parameter for spread, most sexual networks are very sparse, raising the question of how they can sustain epidemics. Much attention has been given to the potential importance of scale free networks, and the linked clustering of small world networks. Less appreciated is the fact that the connectivity needed for sustained transmission can be established with homogeneous low degree networks, especially when partnerships can be concurrent. We demonstrate this with a simulated example, and an empirically grounded study with data from Uganda, Thailand and the US.

The Global Structure of Networks and Veterinary Disease

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Modelling Social network analysis is well-established as an epidemiological tool for modelling diseases of humans, especially sexually transmitted diseases and transmission of infection between injecting drug users. It is

now beginning to be applied to infectious diseases of farm livestock. The aim of this study is to assess the effect of livestock movements on disease transmission, and to develop models to investigate the potential impact that controls of livestock movement may have on disease spread. Data on cattle movement within the United Kingdom (UK) have recently become available as part of the Rapid Analysis and Detection of Animal-related Risks project (RADAR). These data may be represented as a large network. Cattle holdings are represented as nodes, with a movement of cattle between holdings being an edge. This study adopts a systematic approach to considering which structural features of networks are appropriate for disease modelling. The effects of varying particular structural properties are assessed by simulation using an SIR model, and then this information is applied to cattle movement data collected in the United Kingdom. Where previous authors have sought correlations between centrality measures of individual nodes and those nodes' risk of infection, this study looks at how global network structure affects infection dynamics, using survival analysis.

Degree Distributions of Sexual Networks: Should We Buy Scale Free

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The degree distribution is a fundamental attributes of any network and a central focus of research on STI transmission. The degree distribution has been characterized as "scale free" - a set of distributions following a power law and sometimes characterized by infinite variance. When the degree distribution has infinite variance the level of infectivity requisite for a disease to generate an epidemic approaches zero and the critical vaccination fraction approaches unity. Given the potential policy implications of such a conclusion we feel that these results merit further scrutiny. Prior analyses have underestimated the amount of error in the tail of the distribution, ignored social process in favor of simple curve fitting and assumed random mixing despite empirical evidence to the contrary. We test the fit of II models to five different nationally representative samples of the United States. Our results indicate social process models fit as well or better than scale-free models.

T4: On-Line Communities A

The social network of an online university

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In this study we analyze the e-mail network of the Universitat Oberta de Catalunya ("Open University of Catalonia", UOC). UOC is an online university founded in 1994 and located in Barcelona. Nowadays UOC has more than 35,000 undergraduate and graduate students, more than 2,000 members of the faculty and around 400 administration staff. Faculty is distributed among a number of schools. All of UOC's courses are imparted online making use of an in-house developed Learning Management System, the Campus Virtual, which includes an e-mail system. This system is meant also for internal communication among the members of the organization faculty or administration personnel and is extensively used due to the virtual character of the organization. Therefore, the e-mail system is the main communication channel of the institution and the e-mail network is far more representative of the real social network than in more traditional organizations. For the representation of UOC's e-mail social network we make use of the log data recorded during a period of one month. In that time, 854,522 messages were recorded, from which 462,033 were internal. The analysis of the different features of the resulting network allows for a characterization of the particular informal structure of social relationships within the university. When compared to similar studies made in other institutions and, particularly, in brick-and-mortar universities, our results reflect the singularity of the organizational model of the university and the informal social ties among its members. For instance, relationships among different schools acquire more relevance, administrative personnel tend to play a more central position and students social links within the institution are more scarce.

Investigating Evolution of Community in Blogs

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Blogging, as a communication medium, promises to facilitate social interactions that create or strengthen virtual communities through networks of inter-linked postings that discuss topics of common interest. Social interactions around blogging have been studied previ-

ously by researchers such as Nardi et al. (2004), Blanchard (2004), and Herring et al. (2005). In this paper, we examine how communities can be discovered and grown from the structure of blogs. Past research for identifying community has involved using content analysis (Wei et al., 2004), examining artefacts using Jones' concept of a virtual settlement (Efimova and Hendrick, 2005), and clustering algorithms such as Kleinberg's bursty algorithm (Kumar et al., 2003) and Kohonen's self-organizing map (Merelo-Guervos et al., 2004). Our methodology involves creating a framework for detecting structures in the social network of blogs that can indicate possible community. We apply social network analysis on blogs using the Pajek software (De Nooy, 2005) to obtain visualizations (snapshots) of the social network at different points in time. We draw the analogy that growth of community in blogs is comparable to growth of an individual, and that specific stages in the life of an individual can also be applied to the life of a blog. To evaluate community, we describe a quantitative framework that involves using centrality measures such as degree centrality, closeness centrality and betweenness centrality. We apply our methodology to a case study of a blog that we created (for Canadian independent music) in order to measure community effects in blogging. Results of this research are reported and discussed.

Mapping Student Roles between Physical and Online Discussion Networks

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As the popularity of online networks continues to grow, the need to understand the similarities and differences between the online and traditional offline components of social networks also grows. Do people play the same roles online as they do in face-to-face settings? To address the above question, we chose class-based student social network for analysis. The rise of e-learning has presented a unique opportunity to compare social networks in both a physical classroom and online components. Moreover, increasing emphasis on class discussion in modern education allow us to build social networks. In particular, we aim to address the following fundamental research questions. What roles exist in discussions? Are these roles the same in classroom and in online discussion threads? Does a student take the same role in both the classroom discussion and the online discussion? The study uses a combination of interviews, questionnaires, and content analysis to untangle the intricate patterns and construct meaningful mappings of student roles as their discussions move from the classroom to online forums. We first elicited a list of roles from surveys and then, using qualitative analysis, created 5 major categories including leaders, motivators, fringe, soloist and participants. Based on the discovered roles, we compared the students' self reports

against the instructor's perception as well as compared the students' self reports for both classroom and online settings. This is an ongoing study. The preliminary results of this study will improve our understanding of general social networks with dual presence and how they transition from physical to online communities.

The structure and evolution of an online communication network

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We investigate the structure and time evolution of an online communication network of 1,284 students at the University of California, Irvine, over a period of seven months in 2004. In this network, two students are considered connected if an online message has been sent between them. We study a variety of statistical properties of the communication network, including the mean and distribution of numbers of acquaintances that students have, typical distance from one student to another, the existence and size of a giant component, and the degree of clustering in the network. We then analyse the time evolution of these properties, and attempt to uncover the dynamic and structural micromechanisms that govern the observed network structure. We focus on community structure and investigate the extent to which communication occurs between students who share the same attributes. To this end, we use a number of homophily-based criteria for partitioning the network into distinct classes of students, and then carry out a comparative analysis of the strength of these partitioning criteria. While speculating on the role communities play in determining the observed network structure, we identify and assess the critical factors that underpin patterns and time evolution of online communication.

Connected Lives: The Project

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This is the first substantive report of the Connected Lives project, using survey, interview and observational data to study how the Internet (and other ICTs) fit into networked lives. We present findings on networked household and community relations, the management of networks, travel-communication tradeoffs, social capital, and information searches.

T4: Inter-Organizational Networks C

*Predictors of Dyadic Interaction in Emergent
Multiorganizational Networks Following the World Trade
Center Attacks*

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Following the September 11 attacks on the World Trade Center, data was collected from situation reports, status updates, newspaper articles, news transcripts and field notes to document emergent multi-organizational networks (EMONs) which developed in the response to the WTC disaster. These field documents and newspaper articles were coded and recorded to represent the more than 6,600 records of interaction between organizations involved in the initial 12 days following the event. The resulting data set represents one of the largest efforts ever undertaken to capture EMONs in the immediate post-disaster environment. Due to phenomena such as mass convergence to the impact site, the need for improvisation in a changing environment, and the presence of conditions that exceed the capabilities of the pre-existing response system, EMONs typically emerge to coordinate response activities among the many organizations involved in the response process. Relatively little is known, however, regarding the structure of such networks, or the determinants of interaction within them. Here, we examine the probability of interaction between organizations based on attribute data, including type (i.e., government, non-profit, profit, collective), scale of operation, and degree of autonomy. Using exponential family models, we estimate the extent to which organizations work with similar versus dissimilar alters (i.e. non-profits working with non-profits or government organizations working with for-profit organizations). In addition, we investigate the question of whether these effects differ depending upon the functional tasks in which the organizations are involved. These results shed light on the emergence of coordination among organizations of various types in this post-disaster environment of September 11. Possible implications for disaster planning and emergency management are also discussed.

*Corporate Social Capital impacts on Market Performance
in the IT Software and Services Sector*

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Corporate Social Capital (CSC) has been identified as social capital in the context of organizations. Leenders and Gabbay, 1999 raised the awareness of CSC in their excellent volume of contributed papers, focusing on concepts, theories and the application of social capital to business. While there has been substantial research on social capital at the individual level, corporate social capital at the firm level has only been lightly researched. This research builds a bridge between the fields of social network analysis and intellectual/intangible capital. Identifying the key contributors to the widening gap between market and book values (market value add), is still proving elusive. Substantial research has been focused on disclosure through intellectual capital (IC) statements. To date, IC statements have gained minimal acceptance by market actors. The promotion of corporate social capital, as a leading indicator of market value add performance, is driven by an increasingly networked market place, and the increasing importance of market place relationships. The IT Software and Services Sector has been selected for the conduct of the empirical research. A "social" network representation of firms participating in this sector has been built using alliance and joint venture information mined from the Factiva news service. This information has been supplemented with data available from an industry data base (Computer Wire) of major IT contracts signed, providing the client, vendors, date and size of contract. Preliminary results indicate that the high centrality firms are the "systems integration" firms who typically assemble solutions for clients from products or services developed by other firms. When firms in the market network were assessed for a possible association with high market to book premiums, it was found that the high centrality systems integrators did not achieve high market to book values. However, those firms connected to multiple systems integrators did tend to achieve high market to book premiums. In other words, those firms connected to the highly connected firms appear to benefit most in terms of market to book premiums. This finding is consistent with a formulation of status or rank prestige (Wasserman and Faust, 1994). Measures such as the eigenvector centrality (Bonacich, 1972) could potentially identify these firms, though some modification may be required to cater for differences between firm and individual level analyses.

*Running in Place: Status and Identity in
Interorganizational Influence Structures*

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This paper builds upon structural models of social influence in organizational fields by proposing a two-dimensional model. It posits that key decision-makers are most likely to be influenced by alter organizations that are slightly higher in status, and individual acts of deference link aggregate organizational positions within an emergent status order. This status dimension, however, may be more or less correlated with categorical distinctions between organizational actors as a basis for influence. Hypotheses concerning dyadic emulation choices and the resultant structural properties of organizational fields are tested using a recent survey of American university and college presidents. Findings from dyadic models provide strong support for the general assertion that organizations are influenced by alters in a curvilinear relationship with their status differentials; yet the resultant macro-level influence structure (derived from cluster analysis and blockmodeling) demonstrates that status is not entirely correlated with identity dimensions such as shared geography, mission, and ideology, preventing the formation of a single status order in American higher education. While organizations tend to run in the same status direction at the same speed, a field may consist of several semi-auto-nomous status subnetworks based upon identity attributes. This serves as the proposed basis for further comparative research of influence across fields.

Social Network application in external Knowledge search

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External search is the greater source of knowledge to an organisation. External knowledge is located in communities of practice that network between organisations. This research presents the theoretical foundations of external knowledge search and presents the first round findings from a network analysis of communities in high technology firms.



Friday Morning Part One

F1: Vizards Session

At the Sunbelt XXII 'Vizards session', we presented different analyses and visualizations of the media coverage of the September 11 terrorist attacks, at Sunbelt XXIII we analyzed 'The Summer Joker' network, at Sunbelt XXIV our attention was on the players market of the football World Championship 2002, and at Sunbelt XXV we analyzed KEDS (The Kansas Event Data System) networks about political events in critical regions such as Middle East and Balkans.

With this year's session we are continuing this tradition. Rather than a series of contributions on related subjects, this session features a single, joint presentation by all contributors. Our aim is to demonstrate the richness and power of network analysis, in particular when supported by visualization. We therefore present a multi-perspective analysis of a single data set, utilizing a broad range of visualization methods.

This year we will analyze IMDB (The Internet Movie Database) networks - <http://www.imdb.com/>

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F1: Opinion Leaders and Diffusion

*Advice and Influence: The flow of advice and the
Diffusion of Innovation*

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Finding the influential people in a community is key to diffusion process of technological innovations, as well as other kinds of products. This information is traditionally obtained through costly ethnographic studies which are not necessarily efficient. In certain endeavors the use of socioeconomic and demographic measures characteristic of those ethnographic studies is not effective, because the target population is very homogeneous. In the specific case of diffusion of advanced digital technologies in underserved communities or rural areas the challenge of economic sustainability becomes an issue and the cost of traditional methods to find who are the influential members becomes prohibitive.

We explore the use of sociometric information as a supplement to socioeconomic and demographic variables to determine the influential members of a community, under conditions where conventional methods may fail. We believe that identifying the structural characteristics of the flow of advice plays a key role in this space. We explore the theoretical possibilities of different possible graph-theoretic measures given data about networks.

An empirical study of these ideas using data on a community of Costa Rican coffee growers is reported. We collected sociometric data from 122 producers and

compare our results with an independent ethnographic study of the same population. It turns out that the flow of advice captured by a generalized measure of eigenvector centrality, controlling for age and innovativeness using a logistic regression method, produced a good predictor of the influential members of the community. In terms of the positive predicting value our results suggest that we can double the precision (for this particular data set we got 91.66% vs. 45% obtained by the conventional methods).

Co-Authorship Network Position and the Adoption of Innovations: Implications for Diffusion of New Knowledge

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This study examines the effects of network position on the adoption of innovations. Specifically, we argue that collaborative research behaviors and the resulting structure of the ego network affect how ego's innovations (i.e., knowledge contained in published journal articles) diffuse to the larger, global network of potential adopters. In particular, we look at interlock and radiality of the ego network (Rogers 2003, p.338) and posit that these local behaviors predict ego's prominence (measured as Eigenvector and Betweenness Centrality) in the global network, as well as the adoption of ego's innovations. Employing multiple regression and structural equation modeling, we use multiple indices to describe ego network interlock and ego network radiality. Size, number of ties among alters in the ego network, and average geodesic distance among pairs in the ego network capture interlock, while brokerage, number of weak components, and 2-step reach capture radiality of the ego network. Interestingly, radiality (the extent to which a set of individuals are linked to a focal individual but do not interact with one another) has a strong effect on actor prominence and the adoption of innovations (measured as citations per actor). Interlock (the extent to which ego is connected to a set of individuals, all of whom interact) also has an effect. These results are based on a snapshot analysis of collaboration among 1262 marketing researchers over a 10 year period. Generally, this study examines the relationship between the innovator's network position and adoption, whereas prior studies have focused on the relationship between the adopter's network position and adoption. These results have implications for knowledge diffusion theory in that we are able to demonstrate effects of the actor's network position on the adoption of that actor's innovations.

Hierarchical Structures in Interpersonal Communication Networks

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Most of the research on the multi-step flow of communication hypothesis emphasizes the identification and description of opinion leaders as a specific communication role but misses out to analyze the structure of the whole network. This is remarkable because the hypothesis not only assumes the existence of different communication roles but also a hierarchical structure of the network. In this study, the general communication structures in school classes (including multiple topics) are considered -- not only the diffusion of a specific information. The research question whether there is a multi-step flow in general communication behavior is discussed in two steps. In a first step, different methods to analyze and describe the hierarchization of a digraph are suggested: graphs centrality according to Freeman (1979), the hierarchy indexes according to Krackhardt (1994), the triadic census and the ranked clusters according to Davis and Leinhardt (1972), the M-Clique according to Johnsen (1985) as well as the symmetric-acyclic decomposition. This contribution discusses the various approaches but focuses on the application of the symmetric-acyclic decomposition and proposes two new indices to describe the extent and structure of the hierarchy found herewith. In a second step, the personal attributes of the people (N=86) on the different hierarchical levels are analyzed to test whether they support the classic hypothesis of Lazarsfeld et al. (1944). Therefore the possession and use of mass media are of special interest. The findings point to an increased and more purposeful TV-use of the 'ruling level' and therefore support the hypothesis of a multi-step flow of communication regarding the general communication behavior in a social network.

Online Discussions and Flow Leaders

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Online discussions create a unique form of communication network. By posting and responding in a discussion, Internet users create networks that are a hybrid of mass and interpersonal communication. That is, from a sender's point of view, out-links are a type of broadcast because they are meant to be read by all. From a

receiver's standpoint, in-links are responses to messages and therefore create a directed network. This distinctive network calls for a conceptual framework that would encompass both interpersonal and mass communication activities. Usenet is a unique example of online discussion because, unlike other online discussion platforms, it has no central control such as a site creator or a server owner. This allows us to explore the interaction of participants free of external restrictions.

Building on Katz and Lazarsfeld's (1956) classic two-step flow theory, we draw three hypotheses. First, we expect to find flow leaders in discussion threads. In other words, in-degrees will show a skewed distribution, with a few participants receiving a disproportional number of responses. Second, the same flow leaders will show up across multiple threads in a Usenet discussion group. Based on previous research on preferential attachment, which suggests that in large networks, new links attach preferably to nodes that are already well-connected (Newman, 2001), our third hypothesis is: the longer a discussion thread, the more skewed is its degree distribution, and therefore the stronger are the flow leaders.

To test the research hypotheses, we use a sample of threads from political Usenet groups from the Microsoft's Netscan dataset between 2000-04. A Usenet discussion thread is therefore the unit of analysis. UCINET is used to identify flow leaders. Customized software is used to measure skewness of degree distribution. SPSS is used to test the hypotheses about the relationship between size of threads and their skewness.

Identifying Physician Opinion Leaders from City Surveys

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We explore whether census surveys of physicians in 4 cities can be used to identify physician opinion leaders for 2 different medical conditions. Surveys were mailed using a secondary database of addresses and physicians were asked to name up to 7 discussion and referral partners. Data revealed clear network structures with several large connected components being identified in each city. We identified opinion leaders in each city and discovered moderate correlations (about $r=0.40$) between indegree (number of nominations received) and self reported leadership from a validated scale. Physician specialty and practice characteristics were also associated with indegree.

F1: Sex, Drugs, and Social Networks B

Assessing the Effects of Social Network Variables on Project Retention: It's How You See Them Not How They See You That Matters

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A challenge of most prevention intervention research projects is maximizing project retention. However, little research has examined the potential role of social network variables. Social network variables may allow us to get a better picture of the influence classroom context has on project retention. Participants in this study were 1649 seventh graders enrolled in 36 rural schools. There were two intervention conditions and a control condition. All participants were asked 12 items about the other students in their grade. The independent variables included the indegree and outdegree for each of the 12 items. The outcome variable is present/absent for the administration of follow up surveys for waves 2 thru 5. Standard t-tests were conducted. Four variables (all outdegree) significantly predicted retention across all waves: disruptive, starts fights, gets mad easily, and cooperative. Individuals that listed more students that were disruptive, got mad easily or started fights were less likely to be present in the project. The fewer people the student listed as cooperative the lower the retention. It appears that a "negativity bias" in person perception is a predictor of project retention. In each instance the significant predictors deal with the individual's perceptions of others; if they list more negative and fewer positive individuals they are less likely to be present for project assessments. This suggests, that it is not the individual that everyone labels as disruptive that is not present in the project but rather it is the individual that labels everyone else as disruptive.

Exposure to Cognitions through social networks leads to Marijuana & Alcohol Use

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Past research has shown that social environment and associative memory predict drug use behaviors, yet there has been little emphasis on the connection between these two systems. In this study, the relationship between cognitive organization and social structure is examined by measures of associative (implicit) memory and formal social network information. Exposure to implicit cognitions through one's friendship ties is examined under the basic premise that cognitive biases can be

transferred between individuals before these cognitions are explicitly expressed.

Implicit associations are measured by a count of drug-related words an individual generates in response to two types of cues, which relate to either affect or environment. Data are presented that test the hypothesis that implicit cognitions among one's local social network (based on friendship linkages) are positively correlated to a person's own drug-related cognitions and drug-use behaviors. That is, we show that the influence of cognitive biases towards drug use (coded free association responses) and network drug-use cognition exposure (coded free association responses of nominated network members) can improve predictions of drug use behavior. Findings are discussed in terms of their implications for behavioral interventions and prevention strategies.

The relative contribution of sex and drug ties to STI-relevant network connectivity

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For sexually transmitted (STI) and other bloodborne infections to spread, there must be a connected network capable of transmitting infection from one person to another. While it is well known that both unprotected sexual contact and needle sharing contact can lead to infection spread, we have much less information on the role each type of tie plays in connecting a wider population. In this paper, we assess the relative (to random) contribution of sex and drug ties for multiple measures of network connectivity.

Homophily and Assimilation among Adolescent Substance Users

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We analyse the co-evolution of social networks and substance use behaviour of adolescents and address the problem of separating the effects of homophily and assimilation. Adolescents who prefer friends with the same substance-use behaviour exhibit the homophily principle. Adolescents who adapt their substance use behaviour to match that of their friends display the assimilation principle. We use the SIENA software to illustrate the co-evolution of friendship networks, smoking, cannabis use and drinking among teenagers in the West of

Scotland. Some recommendations for health promotion programmes are made.

Substance-based Informal Social Networks: Investigation into Stronger Ties

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In this paper, informal social networks based on substance use are the main focus. Substance-based networks external to an organization but involving organizational parties may hold unique and interesting properties not previously examined. Antecedents to substance-based informal networks are examined, as well as any possible organizational consequences. The most widely consumed and socially acceptable substance (alcohol) will first demonstrate the existence and utility of such networks. Further, informal networks based on marijuana use and networks based on cocaine use are examined. Generally, it is argued that regardless of the substance used, networks based on substance use, and particularly illicit substance use, will involve the strongest ties between members. These strong ties may create increases cohesion and trust within the informal group while at work, creating positive organizational outcomes.

F1: Intra-Organizational Networks A

*Where you are relative to others in your network:
Implications for distributed work in organizations*

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While prior research indicates that telework, geographically dispersed teams, and virtual organizations are becoming more prevalent, it is unclear how social networks are impacted by distributed work in organizations. For example, employees engaged in telework from home may also spend time at a customer office. And employees on geographically dispersed teams may spend time traveling to other project member sites. Our investigation in a large telecommunications firm consisted of two phases: (1) a qualitative phase where we conducted 1-hour semi-structured interviews with 20 employees about the nature of their distributed work and (2) a quantitative phase where we surveyed over 400 employees in two different divisions about a recent project, including where they spent time working and how frequently they interacted with other project members. Findings from the

qualitative phase indicated that there were many varieties of distributed work reported by employees. Controlling for the physical location of project members, findings from the quantitative phase suggest that being primarily desk-based in a formal company office (compared with spending time at a customer office or traveling) may actually impede frequent interaction with other project members.

Combining traditional survey and social network measures of group cohesion: A longitudinal study

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Over many decades, researchers from a diverse number of disciplines have developed theoretical and methodological approaches to the systematic study of small groups. Within this field, several reviews have emphasised the importance of process variables, in particular group cohesion. A considerable amount of empirical and conceptual work has been published on cohesion but controversy still remains as to its definition and measurement. Furthermore, researchers have adopted diverse approaches to the study of group cohesion. These have ranged from traditional survey approaches to a focus on the interactions within the group using social network analysis. Our current project combines team members' perceptions of both task and social cohesion with the study of their internal social networks. Matched survey and social network data were collected at five points in time during a two year period in the life of a public sector corporate services group (n=30). In this paper, we analyse the longitudinal social network data and cohesion measures and present preliminary results. This work in progress examines the extent to which employee perceptions of cohesion and patterns of social network interaction each reflect the impact of changes occurring in the employees' work environment. We believe this project further demonstrates the value of longitudinal and mixed method studies for increasing our knowledge of group dynamics.

Exploring the Contributions of Human and Social Capital to Productivity

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This paper investigates how human and social capital contribute to individual productivity in three organizations. We study firms that complete all their tasks in projects, two of the firms are R&D institutes with main

emphasis on economic and social analyses. The employees in all firms initiate and organize their projects. We collected archival data from the firms on performance, human capital, tenure, gender of all employees, and their project activities. In one firm the dependent variable is performance defined as number of projects completed, in the second firm we use hourly contribution from project work, and an index of publications is the performance variable in the third organization. We used a questionnaire on the internet in one organization to map the social networks of the participants and interviewed everybody in the other two firms. Using effect screening regressions we find that social capital is the most important factor to determine productivity. We found mixed effects from human capital, only in one firm did human capital have a noticeable effect on productivity. Controlling for human capital and social capital, tenure has no effects on productivity. We found that men are more productive than women in two of the firms. In the third firm, women were slightly more productive than men.

E-mail May Not Reflect The Social Network

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Researchers have demonstrated that e-mail archives can be used as a good approximation of social ties (Tyler et. al.). This paper demonstrates that ties obtained by mining e-mails archives do not necessarily provide a complete and realistic approximation of interactions by other communication channels. The results of our project indicate that factors such as co-location and the nature of working relationships influence the preference for rich media like chat and face-to-face. We have collected the e-mailboxes of a sample of 25 students and researchers, representing 50% of the entire population of a university research department. Through an online questionnaire sent out once per week for 7 weeks, we collected quantitative data on the average frequency of communication using different media: face-to-face meetings, chat, and telephone. During the three months period under observation, 64% of our sample members worked in the main Campus building, 20% in a secondary building and 16% off-site. The comparison of the complete networks suggests that e-mails and chat, as well as e-mails and face-to-face, are negatively correlated, while face-to-face and chat are always positively correlated. People who are co-located, who are peers and who are working on the same project are more likely to use face-to-face and chat. As suggested by previous social network studies (Haythornthwaite, Wellman), the use of rich media strongly predominated, while telephone was scarcely used, and chat was enthusiastically adopted as a supplementary way to face-to-face interaction.

Interdependencies between Reputation, Friendship, and Cooperation in Networks of Strategy-Making

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Collaborative networks and their antecedents have been examined intensively for various areas in organizations. Particularly, the influence of friendship on collaboration has been devoted considerable attention and numerous authors have suggested a positive relationship between the two constructs. Likewise, the impact of reputation in corporate networks has been stressed. By defining both an actor's perceived position in the networks as well as his or her access to scarce resources, reputation represents an important indicator of an actor's power and influence within collaborative processes. What has been neglected so far is an integration of friendship and reputation into a single framework and the examination of both the interrelations between both constructs as well as their simultaneous effects on cooperation. Based on a discussion of the extant literature, we derive propositions about the interdependencies existing between reputation, friendship, and cooperation. To test our propositions empirically, we employ a comparative case study. Data has been collected for the strategy making process among all top executives of two German multinational corporations (48 and 63 actors respectively). The actors are differentiated according to their hierarchical level, the function of the corporate unit they represent (i.e., board members, subsidiaries, product and geographical divisions, and central service units) as well as their assignment to macro-level corporate sections. Applying a multiplex p2 model with MCMC estimation allows us to model the effects proposed for both companies. Not only do we find high levels of interdependencies between reputation, friendship, and cooperation, our results also reveal significant differences between the actors participating in the strategy making process as far as their attractiveness and productivity (outgoingness) within the individual relations is concerned. These differences are shown to be contingent on the actors' attributes that have been considered as covariates in the p2 model. Although the two companies examined differ substantially with respect to several of their characteristics, the results of our analysis reveal a number of consistencies.

F1: Trust, Uncertainty and Advantage

The effect of trust on the accuracy of design development information flows in UK construction new procurement systems: A social network analysis approach

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As a result of innovations in procurement strategies, construction project coalitions are moving away from their arm's length, adversarial and competitive nature, into long term, integrated inter-firm relationships. More collaborative approaches such as the use of supply chain management and work or technology clusters have become contemporary themes in the industry where a coalition of firms enter into long term partnering relationships to undertake projects (Pryke, 2004). Latham (1994) recommended that traditional adversarial relationships in UK construction, involving high levels of transaction costs, be replaced with those built upon trust. Trust influences the effectiveness of knowledge and information exchange between project coalition members as it facilitates the exchange of resources and information that are crucial for high levels of project performance but which are difficult to transfer via market ties (Uzzi, 1996).

This ongoing research project investigates the UK construction industry's new procurement systems in an attempt to study the relationship between trust and the accuracy of design development information flows in construction project networks, and how this may impact upon project performance. The research paper will argue that a positive correlation exists between the level of trust and the accuracy of design development information flows in the project network, proposing that trusted relationships are more accurate (Golbeck, 2005). It will also argue that this relationship is influenced by a number of network characteristics including tie strength, path length and actor centrality. Considering tie strength, the research paper argues a positive correlation between the strength of the tie and the accuracy of the information flow, mediated by the level of the tie's trust. Moreover, because trust is not perfectly transitive (Guha & Kumar, 2004), the paper argues that trust decreases along a chain of connections, thus suggesting a negative correlation between path length and the level of trust and consequently the accuracy of information exchange. Regarding centrality, the research paper argues that the greater the centrality of an actor, the greater their influence on the formation and maintenance of trusting relationships and the greater their impact on the flow of information.

Gender, Network Social Capital and Social Trust

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Trust is one of the most fundamental elements of the social interaction which plays a determining role in resolving issues related to social order. Ties and social relations are the main factors in establishing and maintaining trust. This paper investigates the role of network social capital, in reinforcing reciprocal trust among Tehrani men and women, based upon analysis of data derived from a survey of 320 respondents above 18 years of age residing at 3 different districts of Tehran. The results reveal that as the network social capital increases, the interpersonal reciprocal trust increases. Employed and married people enjoy a higher level of network social capital as well as reciprocal trust. Findings also show that men and women do not differ in regards to their networks' structure and composition; however, they differ in the functional and relational features of their networks. Among personal characteristics, employment status is the main factor which differentiates men's and women's networks.

Leveraging Social Networks to Aid in Online Trust Assessment

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The World Wide Web is filled with unreliable information, unscrupulous merchants, and malicious attacks. As a response, an increasing number of commercial websites have set up reputation systems in order to aid customers in evaluating products and services, as well as increase trust in the company. This paper proposes that we leverage an individual's social network to extend beyond localized and branded reputation systems in the evaluation of website authenticity and reliability. This paper will present historical data from early print culture to demonstrate that people have formerly relied on social networks to negotiate saturated and uncertain information environments. Unreliable information was evaluated through the transfer of trust inherent in personal networks to entities outside of the network. Furthermore, current research findings indicate that individuals continue to rely on trust transfer via social networks for information evaluation in complex environments such as the Internet. Drawing on historical experience, this paper will discuss how social networks can be leveraged to create a more trustworthy and reliable environment in the new print medium, the Internet.

Structural Properties of Power-Relevant Relations

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"Power" is a recurring, if not unproblematic, theme in the study of social networks. While many concepts of power have been explored, all have in common the notion that social actors are potentially unequal in their capacity for attaining goals within a contentious environment. Such inequality may arise through a variety of relationships, ranging from kinship (fictive or otherwise) and institutional authority to interpersonal dominance and exchange. While many studies have examined the causes and consequences of such "power-relevant" relations, much still remains to be learned about the structural properties of power-relevant networks in natural settings. Here, we identify several structural properties with clear implications for the exercise of power through interpersonal networks. These properties are then evaluated on 10 power-relevant relations in 61 communes from the Urban Communes Data Set. Using conditional uniform graph tests, we identify systematic tendencies acting to enhance or inhibit local versus extended control, mutual versus asymmetric power, unity versus disaggregation, and competition. Our findings suggest substantial diversity among power-relevant relations, although some systematic biases are present. Implications of our findings for power dynamics within organizations and extensions to other settings are discussed.

Cupid Alliances: Exploring Behavior Dynamics During Alliance Formation Between Unembedded Firms

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The organizational alliance and network literatures have made significant contributions to our understanding of interorganizational alliances by identifying the importance of prior network ties in the likelihood of future relationships. Organizations typically choose prior partners in shaping future alliances as a mechanism for reducing relational and performance risks associated with partnering. However, sometimes organizations are not free to select their partners. The research reported on this paper is a detailed analysis of one such case. This study explores the development of interpersonal and interorganizational trust in multiparty alliances where potential partners with no prior alliance ties are "shot" by a cupid organization. That is, they face an incentive structure that strongly encourages them to partner with each other and imposes penalties if they do not. These relationships are considered in the context of both the networks in which each of the actors are embedded, as well as the resource dependencies (on the cupid organi-

zation) which may be motivating the relationship. Preliminary findings in this case study, based on the analysis of both qualitative and network data, suggest that prior network ties impact initial levels of trust and embeddedness. More surprising is the finding that although the firms chose to enter the alliance, levels of trust between partners with no prior network ties did not increase, and actually decreased over the course of the negotiation period. These initial findings seem to warrant further research into the role that resource dependencies and rewards exogenous to an alliance play in the development of trust and the ultimate formation of alliances.



Friday Morning Part Two

F2: Technology adoption and social networks

Network Effects, network structure and consumer interaction in mobile telecommunications in Europe and Asia

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How do consumers choose their mobile phone operator? It has long been established that consumers coordinate their product choice based on information they receive from their friends and families. However, in mobile telecommunications, companies can also actively support this coordination by charging different prices for calls to the same network and calls to other mobile networks. Consequently, the total cost of calls is lower, if people that a consumer calls frequently are on the same mobile phone network. In this research, we are analysing if and to what extent different groups of consumers coordinate their choice and highlight through which channels this coordination might occur. This is done using social network data obtained from surveys conducted among students in several European and Asian countries, in which the respective mobile phone operators pursue a number of different pricing strategies. Preliminary results indicate that students strongly coordinate their choice of mobile phone operators, but do this only for operators which charge a price difference between on- and off-net

calls. Coordination is strongest within groups of students from the nationality, but also within the same nationality, respondents who frequently interact with each other are more likely to choose the same operator. Contrary to mobile phone operators, respondents did not coordinate their choice of mobile phone handsets – there rather is a tendency to choose a different handset than the one used by their friends.

A Structural Analysis of Cell Phone Attitudes and Usage Patterns

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The cell phone holds considerable promise as the integrative mobile device of the future for both personal and business usage. Because of the many commerce advantages associated with integrative mobile devices, a survey was conducted to assess cell phone usage patterns and attitudes. Social network data was collected from individuals regarding who they have listed in their cell phone directory and who they text message. Social network data analyzed with the survey data shed some light on how cell phone attitudes and usage patterns diffuse. Findings indicate that the cell phone directory network is

related to similarity in the belief that cell phones are helpful in one's daily life and that they are worth the money. The text messaging network is related to similarity in the belief that cell phones increase your social life and the belief that cell phones are easy to use.

Relationship between Online Discussion eWOM and Product Sales--A SNA Perspective

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This research looked into the construction of marketing indicators from online communities' electronic Word Of Mouth (eWOM). We systematically gathered the information from discussion board of Taiwan's most popular cellular phone online community (www.ePrice.com.tw) as eWOM data source and acquired the actual sales data from the distributor as the marketing analysis measurement. Through social network analysis methods, the eWOM data were analyzed to form several formats of the customer community's indicators. By the analysis of correlation, this research discovered that the selected cellular phone online communities have strong relationship to the actual market sales data. We present the analysis and the relationship in the paper.

Reciprocity of cross- and same-sex relationships in face-to-face and text message-mediated networks

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This longitudinal study applied exponential random graph models (p*) to investigate sex differences on social selection processes in face-to-face and text message-mediated friendship networks. A total of 70 first-year undergraduates (11 males and 59 females) at a university in Japan provided data on their friendship networks at the beginning (T1) and the end (T2) of their school year, including weaker acquaintanceship ('greeting') networks and stronger trust ('discuss personal matters') networks. Overall, cross-sex ties were more likely to be reciprocated than same-sex ties at each period even after controlling for other structural characteristics of the networks, e.g. popularity and expansiveness effects, and transitivity. In particular, males showed a strong tendency to form reciprocal ties if they were

nominated by females to discuss personal matters face-to-face at T1, but this tendency declined at T2. Conversely, it was less likely at T1 for males to reply to greetings from males via both face-to-face and text messages, but more likely at T2. In discussing personal matters face-to-face, both males and females increased same-sex reciprocity across time. In text message-mediated personal networks, males also showed similar increased same-sex reciprocity, whereas reciprocity of females' same-sex ties was relatively stable over time. In general, the models suggest that, over time, ties were becoming more selective and stronger but with some variations between sexes and media of communication. Females seemed more 'adept' at using text messages for personal discussions at the beginning of the year, with males taking a longer period of time to 'adapt' to such behaviors.

*F2: Prospects and problems
in social network analysis*

What is network theory?

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A classical criticism of the social network field is that it is not theoretical, but rather descriptive or "just" a method. This paper tries to take this seriously and evaluate the state of theorizing in the field. In the process, it grapples with the question of what qualifies as network theory. It also discusses possible reasons for viewing the field as non-theoretical.

A Note on the Value of Stylized Facts in Network Analysis

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Stylized facts can be a productive device for deriving theory out of case-study network analysis. By making explicit data associations to be expected, stylized facts are an anchor for cumulating results across studies and a method-of-residues baseline for highlighting seemingly-contradictory, corroborative research results. In general, I'm thinking of stylized facts as data graphs with theoretical content that you'd be surprised to see not occur in a set of network data. After contrasting stylized facts with empirical generalizations, middle-range

theory, and paradigms, I describe two stylized facts that I have found theoretically productive at the intersection of sociology, psychology, and economics: One is the association between network stability and network closure. The association is familiar, but varies in an interesting way with the age of a relationship. Second is the association between achievement and network brokerage. This association has become increasingly familiar in organization research, but it too has productively interesting contingencies.

A Paradigm Too Far? Reconsidering Social Network Analysis As Normal Science

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Social network research from the perspective of Imre Lakatos's emphasis on core ideas involves a succession of "protective belt" theories drawn in the spirit of the positive heuristic of the program. This is in direct contrast with the current emphasis in social network research on paradigmatic thinking and puzzle solving. Lakatos's indictment of the paradigm approach to science sought to rescue the autonomy of theory from the triviality of puzzle solving, to challenge that claimed incommensurability of rival research approaches, and to provide a rational basis for the progress from one theory to another. From a Lakatosian perspective, there are at least four interrelated principles central to the construction of new theoretical ideas concerning social networks: the primacy of relations, the ubiquity of actors' embeddedness, the social utility of network connections, and the structural patterning of social life. From these ideas theories have been drawn concerning both the structural configuration of network systems and centrality of individual actors. I will present a new theoretical protective belt approach focused on the mutual constitution of complexity and distinctiveness by both networks and actors. So I will draw the distinction between the Kuhnian and a Lakatosian approach, identify core ideas at the heart of network research, and suggest how these core ideas can be extrapolated in new theoretical and research directions.

Issues of Emergence, Diffusion & Visualization in Dynamic Networks

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A growing body of network theory & research focuses on dynamic networks. This presentation describes some of the compelling puzzles & unique challenges of dynamic networks. Theoretically, dynamic networks raise interesting questions about how changes in local behavior (nodes & edges) can generate particular macro-network structures, how time is aggregated to form structures,

and how edge timing determines diffusion over networks. The strong link between network analysis and visualization is also challenged by dynamic networks and throughout the discussion I ask how visualizations of dynamic networks helps us build intuition and theory.

F2: Network Dynamics A

Interpersonal Influence and the Dynamics of Polarization

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We develop a formal model of interpersonal influence over attitudes in a context where individuals hold simultaneous positions on multiple issues. Social structural dynamics operate to enhance the probability that people with similar attitudes will interact, but actors in our model also interact with those whose attitudes are different. When people interact they talk about the issue that is most salient to them, and these conversations are seen to provide the foundation for personal influence. This influence may operate to bring individuals closer together or it may induce greater distance. Through simulation, we show that, when a single issue monopolizes public discourse, simple mechanisms of social interaction and personal influence lead to both social and ideological polarization. This simple model accounts for two puzzling empirical outcomes that suggest the simultaneous presence and absence of polarization in contemporary US public opinion. The first outcome is that attitude polarization is relatively rare, even though people experience it as common. The second outcome is that while individuals experienced attitude homogeneity in their interpersonal networks, these networks are characterized by attitude heterogeneity. Along the way, we identify the social dynamics that underlay issue takeoff, and therefore describe one of the structural determinants of ideational change. The framework we develop is amenable to generalization to a wider array of problems, including classic problems in collective action and the study of political cleavages.

Network Evolution: Exploring Advocacy in the European Union

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Political entrepreneurs differ from other social agents since they have a different incentive structure determined by their attempt to control or exercise political power. Within current EU governance political entrepreneurship is often related to attempts to influence policy making or alter agenda preferences of other actors. Attribute based accounts of these actors' role are deficient

in their depiction of the relational elements of their interaction. A network approach can incorporate the structural constraints and actor/ agency attributes with an account of actor relational data. Networks provide the context within which these actors thrive. Furthermore, as all entrepreneurial activity bears risks, networks are employed to mitigate them. Entrepreneurial risk is therefore moderated by the ability of actors to draw support from their network of relations. Furthermore, accepting the premise that political entrepreneurs are network dependent implies that their ability for political action is network contingent. Focusing on their network attributes, I attempt to identify those significant for the entrepreneurial behaviour of policy actors. A case study of agenda setting amongst policy entrepreneurs provides the background for testing a set of hypotheses on the behaviour of these actors. The network examined is the advocacy network of actors in the Charleroi/Ryanair decision of the EU and the successful elevation of the issue of the 'regional dimension of air connectivity' in the EU policy agenda. Relations between twenty four actors are examined, (as induced by informant and public record accounts) while network evolution is analysed over two time points in February and July 2004.

The Co-Evolution of Personal Networks and Communication Media Usage

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Traditionally, personal relationships are primarily held to be developed and maintained through face-to-face contact. With the increasingly widespread adoption of new communication media such as text messaging, Internet telephony and instant messaging, an interesting question becomes how different types of personal relationships and the usage of these media affect each other. An influence-type argument would argue that communication media usage follows from the relationship between the two actors, in particular the strength of the relationship, whereas a selection-type argument would suggest that relationships develop from commonalities in media usage patterns.

I study this co-evolution using longitudinal data from a group of incoming graduate students at a Dutch university. Personal networks and communication media usage were collected at three points in time, as well as personality data at a single point in time. Analysis with SIENA shows that although both selection and influence play a role, the effect of influence seems more dominant. Follow-up analysis shows that most relationships increase in strength over time, but whereas some relationships stick to a dominant mode of communication, others use increasingly more media, as well as non-face-to-face media more intensively. The latter seems particularly the case for more homophilous ties.

Multi-theoretical multilevel modeling of the co-evolution of social relations and individual performance

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Silvia Profili

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The aim of this paper is to study the co-evolution of social relations and individual performance. The relevant literature has widely recognized the influence of an individual's network relations on their individual performance and has highlighted the impact that social relations have on it over and above individual attributes alone. Less well understood is the concurrent influence of individual performance on social relations. This paper investigates the mutual influence between individuals' performance and their social relations. The investigation addresses two significant limitations of much prior network research in this area. First, prior research focuses on one theoretical mechanism at a time to analyze the antecedents and consequences of network structures. Second, prior research tests these mechanisms using cross-sectional rather than longitudinal data. This paper tests multi-theoretical mechanism that explain the co-evolution of individual performance and social networks using longitudinal data that have been collected within a learning context at three points in time. The study investigates four relationships that according to relevant literature are considered as the most critical correlates for the individual behaviour. These are communication, advice, friendship, and esteem relationships. The dynamic multi-theoretical, multilevel (MTML) model was analyzed using appropriate software called SIENA (Simulation Investigation for Empirical Network Analysis).

F2: Politics and Networks Structures

How Governments Think – 1: Using networks to explain 'innovation culture' in different governments

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This paper examines the nature of innovation by investigating how actors in different governments conceive of innovation and the utility of governmental processes in innovation, and how networks matter. Elected politicians and bureaucrats from eleven municipal governments in the State of Victoria (Australia) were surveyed using a questionnaire. Respondents defined their normative positions according to several proposed definitions and attributes of innovation, and evaluated their institutional

processes in relation to innovation. They also identified significant local innovations and key innovators in their own governments. Network information was collected on ties based on 'obtaining advice' and getting 'strategic information'.

Factor analysis was used to highlight the different sets of assumptions and dispositions with regard to the nature of innovation inside government and with regard to the role played by aspects of the normal operations of government such as the managerial and electoral systems. The study shows substantial differences with regard to the normative and institutional dimensions of innovation across governments. Network structures are substantially different in different government systems. A particular pattern of connect-edness at the local level contributes to a form of local 'innovation culture' based on three key attributes which we group under the headings -- extroversion, management centredness and collegiality.

Money and Influence in the U.S. House of Representatives

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The issue of campaign finance is a perennial point of contention during every election cycle. The process has been examined from many angles, whether it be measuring the quantity of money going into campaigns, who gets the majority of money, or what kinds of organizations give the most money. While these studies have provided valuable insights into the details of the system, an aggregate view of this system has not yet been realized. Social network analysis (SNA) gives us the tools necessary to produce this visualization, and its methodologies and measurements can be applied to any system—including campaign financing.

The following paper studies the social network of the U.S. House of Representatives derived from each member's top contributors in 2006. From this analysis we first gain an overall view of the network, which allows an initial assessment of its size and complexity. Further analysis provides detailed insight into the giving strategies used by the various organizations involved in the system. We distinguish several categories of strategies implemented. We also discovered that these strategies do not translate seamlessly across party lines. Different groups give in different ways; and within those groups, they give to each party in different ways as well. Finally, we discuss some of the counter intuitive features of the network structure, and attempt to explain them based on our analysis and data gathering.

Using SNA to gain insight into this network is a novel approach to assessing the system to campaign financing, and gives analysts more effective tools in understanding the overall structure of the system and key players in it.

Networks of Political Donations: A Study of Interlocking Directorates

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Through the provision of large political contributions, corporations wield appreciable influence over political candidates- and therefore legislation- in the United States government. Interlocking directorates, where one person sits on the boards of two or more corporations, have been examined both for their network properties and to assess the extent to which the American corporate environment is dominated by a relatively small "elite" or "inner circle" of businessmen. While prior research has analyzed interlocks per se, the relationship between corporate political donations and interlock networks has not been studied. A positive correlation of donation practices between corporations with mutual board members could signify some degree of conscious collusion among these actors, or an unconscious consensus to support those politicians who aid business. Here, I examine the structure of the network of corporate interlocks in Fortune 1000 companies for the years 1990, 2000, and 2004, and relate them to patterns of campaign donations made by each company in that year. I consider the question of whether proximity in the interlock network is correlated with similarity in donation practices, defined here as donating similar portions of overall funds to the same politicians. This comparison permits a test of the elitist and pluralist theories of the American party system currently debated in Political Sociology, and aptly uses network methodology to test the existence of an elite group of board members in control of a large percentage of corporate political donations.

How Governments Think - 2: Using networks to explain the roles of politicians and bureaucrats

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This paper investigates how politicians and senior bureaucrats in different governments conceive of innovation and the utility of governmental processes in innovation, and how networks matter. A questionnaire was used to survey elected politicians and bureaucrats from eleven municipal governments in the State of Victoria (Australia). Respondents defined their normative positions according to several proposed definitions and attributes of innovation, and evaluated their institution's structures and processes in relation to innovation. Information was collected on network ties used in 'obtaining advice' and getting 'strategic information'.

The study shows that, in addition to major variations across normative and institutional dimensions of innova-

tion between councils, there are also substantial differences among politicians and bureaucrats. In general, politicians and bureaucrats think about innovation differently, and seniority is associated with positive evaluations of the impact of institutional processes on innovation. Network maps and analyses highlighted important distinctions in the ties between four important sets of actors in these systems – mayors, other politicians, CEOs and other bureaucrats. The local ‘innovation culture’ identified under the headings of extroversion, management centredness and collegiality, reflects differences between governments. But actors in different governments also share innovation cultures with those in similar roles elsewhere.

The Tertius Ruler: A Simmelian Model of Triadic Governance

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In this paper I develop a network-based model of institutional power through revisiting Simmel’s formalistic analysis of dominance. I reconstruct and elaborate Simmel’s theoretical components under the triadic framework in which institutional power plays the role of brokerage (the “tertius”) within the complex web of inter-group affiliations. I draw from Simmel’s writing three control mechanisms that mediate institutional power between societal groups through relational means: network, stratification, and identity; and accordingly I delineate three major strategies deployed by the institutional authority under the strong assumption of state power in the pursuit of maximum control. These three network strategies— divide and conquer, leveling-off intermediate power and mixing-up the existing status system – combine to generate an archetype of strong imagery of institutional power to which I refer to as “the tertius ruler.” The empirical topic to be tested is the emergent fad of alliance networks in Taiwan during 1990s where state- owned firms play prominent role of brokerage. The application of this model to broader contexts is discussed.

F2: Entrepreneurial Networks

Networks of Cooperation and Competition in the Tokyo’s Cluster of Internet Companies

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Using network analysis, this paper categorizes the inter-firm relationships amongst the Internet companies concentrated in Tokyo’s 23 ward’s into cooperative net-

works and competitive networks, and investigates the influence of each upon the industry. The research results found that the network of cooperation, a vital feature of the Silicon Valley model, is currently non-functional in Tokyo. These relationships have failed to develop because venture capitalists are not fulfilling their primary function of supporting start-ups. Furthermore, the dual board memberships that bring cohesion to Silicon Valley do not occur in Japan. In the case of Tokyo’s Internet companies, however, inter-firm cooperative networks can be developed instead through the mediation of the major IT companies. These companies can take on the role of venture capitalists by providing the risk money necessary for new cooperative ventures. As for the network of competition, more important than the actual number of competitors for a particular company is the intensity of the rival company’s competitive environment. Thus, from the perspective of inter-firm networks connected by customers, performance can be improved through a decisive “re-wiring” strategy (i.e., forming rivalries with companies from less competitive environments) or through a strategic affiliation with a major company.

The affiliation network of individual angel investment decisions

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We analyze the affiliation network of individual angel investors and a series of co-investment opportunities. The investment group studied consists of approximately 50 Hawaii-based investors that meet together monthly and listen to presentations from start-up firms that request early-stage investment capital. Following the presentations, interested investors form an ad-hoc deal-team that pursues additional due-diligence investigations and ultimately structures a transaction opportunity with a start-up firm for the deal-team members and for the remaining angels. The deal teams, or lead investors, are self selected, and the decisions to co-invest in a start-up firm are individually made by the angels in the group. The data collected reflect the co-investment of approximately \$10 million in equity-level capital over a three-year period. We provide standard measures and visual representation of the network’s structure. We

perform correspondence analysis on the data and note its structure. We discuss the notion that the individual investment decisions are influenced by the reputation of certain key angels. We show how the social capital within the angel network allows the due diligence process to be successful (or to fail). Finally we demonstrate the effect of ties that exist outside the angel investment group on co-investment. We discuss the implications of using social network theory as a paradigm for analyzing co-investment strategies, its implications for stimulating economic development and the extensions added to the management of investment groups.

Networks Here and There: Transnational Entrepreneurship in the Internet Era

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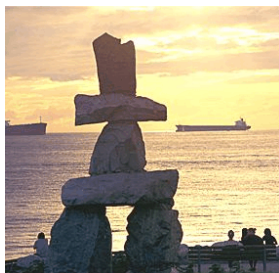
Globalization and technological advancements have expanded the boundaries of people's networks, and consequently the way in which they do business. Immigrants have been a large, growing and dynamic source of entrepreneurship. They are likely to take advantage of the distance and time-zone spanning properties of the internet and other communication technologies to extend such enterprises trans-nationally. Drawing on data from a random sample survey of 310 ethnic Chinese entrepreneurs and 64 in-depth interviews, this paper focuses on how ethnic entrepreneurs -- embedded in social networks and afforded by new communication technologies -- engage in transnational economic activities. Using innovated positional and name generators, the survey captures the transnational aspect of entrepreneurs' networks by inquiring their ties both in the host and home country. The paper explores how network structure and composition here (in the host country) and there (in the home country) facilitate or constrain transnational entrepreneurship. Results suggest that a great number of ethnic entrepreneurs rely on border-crossing networks to expand their business transnationally. Moreover, transnational entrepreneurs have larger, resource-rich, and more diverse networks both here in the host country and there in home countries than non-transnational entrepreneurs. Yet, geographically dispersed networks require continual maintenance and strategic planning. Internet use is instrumental in helping entrepreneurs enhance ties that bond and increase ties that bridge. Accordingly, transnational entrepreneurs use internet more frequently and have more web presence than non-transnational entrepreneurs. As importantly, local connection has not lost its significance. In fact, result shows that networks here are more important than networks there, as transnational entrepreneurs primarily mobilize resources through ties in their local setting defined by geographic, organizational, or ethnic boundaries.

The Role of Informal Networks among Firms and Interest Organizations in the Structuring of Emerging Organizational Communities

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Institutional and entrepreneurship scholars have stressed the systemic nature of new industry emergence and have noted the importance of networks between small firms, large companies, and interest organizations that are collectively involved in commercializing new innovations. Examples are Van de Ven & Garud (1989) on the emergence of cochlear implant technology, Hunt & Aldrich (1998) on the emergence of the commercial World Wide Web, and Powell & Owen-Smith (2004) on the emergence of the biotechnology community. So far however, our understanding of how different types of actors and relationships structure the emergence of new industries remains limited. While studies have demonstrated the importance of organizational diversity for the emergence of new industries, the majority of network research considers only homogeneous networks composed of one single type of actor (e.g. only firms). Moreover, while studies have examined the role of formal interfirm alliances (Powell, Koput, & Smith-Doerr, 1996), little research has investigated the informal interorganizational networks among key individuals working for the organizations that are involved in the formation of new industries (Monge & Contractor, 2003; Smith-Doerr & Powell, 2005). Our paper extends previous work by analyzing the structure of informal interorganizational networks among entrepreneurs and project leaders from respectively 125 small firms and 46 interest organizations that are currently involved in the commercialization of open source software in the Netherlands. This data was collected by means of interviews and a survey, which applied the rosted method (Marsden, 2005) to identify the network ties. We analyze how this emerging organizational community is structured by overlapping relationships (e.g. friendship & acquaintance ties and common memberships) that tie different types of organizations together. In addition, we investigate the roles these organizations play in these networks (Gould & Fernandez, 1989). We find for example a core group of interest organizations that assume important leadership and sponsorship roles in the network (cf. Flanagin, Monge, & Fulk, 2001).



Friday Afternoon Part One

F3: Exponential Random Graphs

Structure, agency and culture in statistical models for social networks

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The structure, agency and culture troika is a theoretical problem of great interest to social scientists (Emirbayer and Goodwin, 1994). Recently, new specifications for exponential random graph (p^*) models (Snijders, Pattison, Robins, & Handcock, 2005), which introduce the use of higher order structures in social networks, have permitted a more detailed investigation of social structures and individual attributes together, providing a possible means to handle both structure and agency. Specifically, the introduction of higher order parameters allows for the examination of networks that are highly clustered using a relatively small number of parameters. This results not only in better accounts of highly transitive networks, but also frees up parameters for the examination of personal-level attributes. In many research contexts, however, the question of culture necessarily arises. In particular, how might culture be incorporated within p^* models? If culture refers to the expectations and norms of behavior within a particular social group, an approach to including culture is to measure the perceptions by individuals of such norms. These can then be incorporated into models as additional node-level variables. We examined friendship relations, individual beliefs and perceived norms of gendered behavior of secondary school students using p^* models. Parameters for individual-level beliefs and perceived cultural norms were not significant when examined in separate models. When both effects were incorporated into the one model, they became significant indicating that the combination of perceived cultural norms and individual level attributes were not just additive but showed interdependency. We discuss the complex relationship between individual level attributes, cultural norms and social structures as well as other possible ways of incorporating culture into network models.

Birds of a Feather, or Friend of a Friend? The Joint Effects of Homophily and Transitivity on Adolescent Social Networks

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Recent advances in exponential random graph (p^*) modeling have provided a practical method for generalized statistical analysis of large networks. In this paper, we consider the friendship networks for 48 different U.S. schools from the National Longitudinal Study of Adolescent Health (AddHealth), ranging in size from 71 to 2,100 nodes. We use the exponential random graph model framework to simultaneously model the effect of three relational processes on the friendship networks in each school. These processes include sociality (the undirected analogue of expansiveness or attractiveness; that is, the underlying tendency to form ties); homophily (the tendency to form ties with like actors); and transitivity (in the undirected sense; that is, the tendency for ties to form triangles). We consider models that include various combinations of all terms, including the full model, and analyze the parameter values for the different effects across schools. We note that the magnitude of transitivity alone is strongly affected by school size. The patterns of homophily exhibited by different grades and by the sexes are highly consistent across a wide range of socioeconomic settings, with a small number of unique outliers. More interesting variation appears in the ways that members of different racial and ethnic groups form partnerships at both the dyadic and triadic levels. We compare these effects in detail for the three largest groups (White, Black and Hispanic).

Curved Exponential Family Parameterizations for Spatial Network Models

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A large body of empirical work demonstrates the presence of strong propinquity effects for a variety of interpersonal networks. Past attempts to model such effects have generally focused on inhomogeneous Bernoulli graphs, in part because of the ease of fitting marginal edge probability distributions to spatial data within this family. More general discrete exponential families offer the possibility of incorporating complex effects such as clustering and constrained degree distributions, but existing parameterizations do not support flexible distance/edge probability relationships. Here, curved exponential family parameterizations are provided for a range of distance effects (including power law, exponential, arctangent, and logistic models). Issues related to model fitting and selection are discussed, as well as the use of spatial parameters in conjunction with other effects. Use and interpretation of spatial models are illustrated through application to a classic study of interaction among windsurfers.

The co-evolution of multiple networks

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 University of Stockholm

In this paper we present a family of statistical models for the co-evolution of multiple networks. Our starting point is a version of the network evolution model originally developed by Snijders (2001, 2002) and extended by Koskinen (2004). Here we develop a natural extension to the case of multiple networks (Pattison & Wasserman, 1999) with realisation-dependent model specifications (Snijders, Pattison, Robins and Handcock, 2005). The model characterizes multiple network co-evolution as a continuous time Markov process in which, at any moment in time there is a possible change in status of some randomly chosen network tie as a function of the multirelational "neighbourhood" of the tie. Thus, the dynamics are tie-based rather than actor-based. Snijders' (2001) estimation approach can be utilised to fit these co-evolution models to longitudinal observations on multiple networks. We argue that, just as network evolution models offer novel insights into the

endogenous processes underpinning network formation, so these co-evolution models offer valuable insights into a variety of possible cross-network evolutionary mechanisms. We illustrate application of the models and describe some important types of cross-network processes.

New specifications for exponential random graph (p^) models for directed networks*

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The new specifications for exponential random graph models introduced by Snijders, Pattison, Robins & Handcock (2005) exhibit dramatic improvements in model fit compared with Markov random graphs. Snijders et al only briefly discussed versions of these new specifications for directed graphs. In particular they introduced the alternating transitive k -triangle parameter, based on completion of multiple two- paths. In this paper, we present a number of higher order parameters for directed graphs, including three new triadic-based parameters not discussed by Snijders et al. These new parameters deal with intersecting cycles on a common base; transitivity based on shared choices of partners (a balance-type effect); and transitivity based on shared popularity. We also present various star-based and two-path-based higher order parameters. We give examples of networks where different types of transitivity effects are required and we discuss the different interpretations of transitivity-related network processes that they suggest.

F3: Social Capital, Social Influence and Diffusion

Influence Structures in a Tongan Village

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This article depicts & analyzes the social influence network among 95 Tongan villagers. A complete network survey was used, asking 2 different influence questions to test hypotheses regarding the influence generating mechanisms at work in this village. Of particular interest are how traditional bases of authority, the extended kin group, and modern resources derived from the small commodity market emerging both contribute to the structure of influence in the village. Influence is captured via measures of centrality derived from the net-

work structure measured by the sociometric responses to two influence oriented questions. In part, the egalitarian rhetoric echoed by villagers is reflected in the network structure, influence is somewhat symmetric. But villagers differ on their span of influence, even though none are invulnerable from the influence of others. Kinship structure is most important in mobilizing votes or opinions; resources based in the emerging cash economy are more important in influencing official decision makers. The research extends the substantive knowledge about the status generating mechanisms in communal societies incorporating more market and democratic relations, showing that different forms of social and human capital are useful in mobilizing influence over different issues.

Learning by connecting, social capital as a learning landscape

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In organizational settings, studies on social capital produced major evidence for the contention that a firm's social capital has an important implication on performance, the level of innovation and even affects career success. More recent studies produced empirical evidence to suggest that there are highly significant links between people's network and their learning. Due to the understanding that organizational members are the critical factor in developing and maintaining competitive advantage, utilizing individual knowledge and skills is increasingly becoming a core task in the field of Human Resource Development. In our economy where knowledge is dominant, daily operations in organizations should be designed to support the process of knowledge productivity. Herein, the skills and knowledge that is created within organizations can be seen as created through groups rather than by isolated individuals. The premise of this paper is that within the organizational context, the ability for an individual to acquire new skills and knowledge depends on different types of connections between the organizational members. The reason underlying this premise is that individuals construct their organizational context in which the acquirement of skills and knowledge takes place. The more individuals are connected, the more likely they will be knowledge productive or innovative. These connections between individuals within the organizational context prove to be a major vehicle to organize and to understand learning processes. Knowledge productivity is a way of facilitating learning, embedded in the social context of organizational teams via meaningful connections between its organizational members. This paper concludes that the

acquirement of skills and knowledge can only be exploited effectively by embodying a social organization. Successful linkages between individuals in a social organization largely dependent on a favourable composition of social capital. The central argument of this paper on social capital and (lifelong) learning is that people's social relationships play a vital part in their capacity for learning. In this paper, this proposition is defended whether learning is simply concerned with the acquisition of skills and knowledge or, more generously, as also being concerned with their creation.

Linking without thinking: weblogs, readership and online social capital formation

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Weblogs have recently emerged as a popular form of personal communication, driven by a wide array of social and personal motivations. These websites provide tools for interaction, but as a primarily broadcast medium, it is unclear whether the authors of these sites have personal contact with each other or their audience. This paper presents an investigation of weblog social behavior through two studies. First, we investigate the structure embedded in the hypertext links made between weblogs, using these references as a proxy to readership. Using data collected through the automated surveillance of one million weblogs over the course of a month, we present a model of attention and influence that proposes a direct relationship between an author's frequency of communication and the size of their audience. Second, to validate this inferred readership data and better understand the personal implications of weblog authorship, we have conducted a random survey of weblog authors. These findings suggest two general classes of authors, professional and social, with differing motivations, behaviors, and effects in offline social life. While professional authors invest more time and entertain larger audiences, social bloggers tend to have more personal contact with their readers, and are more likely to have obtained social capital through ties formed online.

Unsolicited Job Information and the Invisible Hand of Social Capital

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Research on social networks and status attainment has tended to focus on the ways that people acquire job information rather than on how they receive it. And yet, many individuals receive job information without engaging in a job search. Even when people are searching for jobs, their receipt of job information is often

unrelated to the job search activities that they engaged in. Consequently, much is known about the ways that people seek out job information, while little is known about the unsolicited job information that people receive through their routine social interactions. In this study, we use nationally representative data on individuals in the U.S. to examine in detail the relationship between social capital and the unsolicited receipt of job information. The preliminary results indicate that the unsolicited receipt of job information is strongly associated with multiple indicators of social capital, confirming prior assertions that people with the greatest social resources are more likely to receive job information without seeking it out. In this way, the unsolicited receipt of job information represents the “invisible hand” of social capital.

Social Capital and Innovation: Examining small to medium size firms in Spain

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The concept of social capital is promising for the growth and development of Spanish companies. We are developing a model to try and replicate findings regarding the relationship between social network density and small to medium firms with respect to innovation. This paper is a work in progress. We are about to do an empirical computation in small to medium firms in the agricultural sector in Spain. To the best of our knowledge, this has not been tested in this country with respect to firms of this size. We begin with a short literature review to build a working definition of social capital. Three dimensions of social capital (Nahapiet and Ghoshal, 1998), are shown comprise factors which help to define a certain degree of embeddedness and autonomy in both micro and macro level environments (Granovetter, 1985, Woolcock, 1998). As previously shown, factors of these dimensions and the resulting two master-concepts have been measured to create a reference point between communities, companies, and cultures. In addition, we recognize previous work in the field of innovation and social capital (e.g. Ahuja, 2000; Landry et al., 2002), and test to see if findings hold true in our case. Based on its past, Spain like Eastern Europe (Paldam & Svendsen 2001) needs to examine its current level of social capital. At one level, we examine social capital and innovation in the agricultural sector; at another level, we attempt to have an impact in pushing the concept into the Spanish mindset and future academic literature. In future papers, we hope to examine what role businesses and governments can play in developing social capital to help small to medium firms innovate.

F3: 2-Mode Networks

Identifying dense subnetworks in large two-mode networks We present two new direct methods for analysis of large two-mode networks.

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A p, q -core of a two-mode network (V_1, V_2, L) is the maximum subset $W = W_1 \cup W_2$, $W_1 \subseteq V_1$, $W_2 \subseteq V_2$ such that internal (inside W) degree of each vertex from W_1 is at least p and internal degree of each vertex from W_2 is at least q . We present an efficient algorithm for determining (p, q) -cores.

A 4-ring in a network is a (semi)cycle of length 4. Based on 4-rings we can assign to each line in a network its 4-rings weight as the number of different 4-rings to which the line belongs. We developed an efficient algorithm for determining 4-rings weights in networks.

In two-mode networks the role of cliques is played by complete bipartite (sub)graphs. For their lines the 4-rings weights are large - they can be used to efficiently identify dense parts in in two-mode networks.

For illustration, we will also present some results obtained using the proposed two methods. Both methods are available in program Pajek (since August 2005).

Analytical challenges with a dense, longitudinal venture capital network

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Venture Capitalists (VC) are known to fund in syndicates, a legal entity lasting about 10 years, using their advice networks to find, fund, and assist new start-up companies. This research gathers a virtually complete picture of VC firms' funding of information technology startups in the United States during a 20-year period. The resulting collaborative network of VCs, defined as those investing in the same startup firm, was so highly interconnected that very little variation in network variables was evident. Interestingly, while this network mirrored the power law distribution of movie actors, it yielded little network variable variance. When attempt-

ing to relate network indices to startup firm escalation, there were a number of significant results, including two- and three- way interactions, but little variance was explained due to lack of variable variance.

Such problems with a virtually complete network raises questions about the issue of network sample definition, especially when data are gathered over a large time frame, with past links used to predict future behaviors. Ongoing work suggests strategic pruning of ties, particularly of older, broken (not currently active) ones, and using narrower time slices in a time-series. In this paper we discuss present results and suggest alternative ways to deal with the challenges of network definition.

Two-Mode vs. One-Mode: Ranking Differences and Social Interpretation

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“Because the bipartite graph is simply a graph, we can apply the traditional centrality measures directly to this graph” – following the argument of Borgatti and Everett (2005) we apply the concepts of centrality to two-mode data. Empirical researches on real world networks show differences when comparing the centrality rankings between two-mode and converted one-mode networks. Therefore, by analysing random and real world networks, we try to understand which structural properties are responsible for these differences. We also try to offer social interpretations for these different results of centrality measures in two- mode and one-mode network.

Methods for analysis of multi-mode medical data

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In a recent paper in *Structure and Dynamics* (Seary, et al., 2006) we described spectral methods for visualizing and analysing 3-mode medical data consisting of patients of general practitioners, symptoms they report, and exposures that may be related to those symptoms. The results show an unexpected association: people reporting neurocognitive/affect/mood symptoms tend to be the same people that report food/drink exposures. In this talk we also discuss results from a different population of patients - those attending physicians who were not general practitioners. Although the frequency distributions of reported exposures are quite different for the samples drawn from these two populations, the unexpected association persists: people reporting neurocognitive/affect/mood symptoms tend to be the those that report food/drink exposures. We will describe the methods we used for these analyses and some extensions to those methods that are underway.

F3: On-Line Communities B

Linguistic Diversity and Language Networks on LiveJournal

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In the past few years, social network analysis has been used to analyze patterns of linking among weblogs (e.g., Herring, et al., 2005), including within large, self-contained blog hosting communities such as LiveJournal (Paolillo & Wright, 2005). A shared language is a sine qua non for meaningful interconnection. Yet although the growth of blogging has resulted in an increase in the number of languages in which people blog, no study has yet considered language in relation to weblog networks. In this paper, we analyze the linguistic diversity of LiveJournal by randomly sampling journals and coding them for language use. For three of the most commonly-found non-English languages—Russian, Portuguese, and Japanese—we crawl the 'friends' links of 30 source journals, coding the languages used in these, and visualizing the resultant networks. Preliminary analysis suggests that, with the exception of Russian, non-English LiveJournals comprise a small minority, and that the three languages analyzed display differing degrees of network density and homogeneity, with Russian being the most homogeneous, followed by Portuguese and then Japanese. We interpret these findings by identifying a set of technical, individual, and societal factors that may predict language choice and cross-journal linking on LiveJournal.

*Why Do Some Open Source Software Projects Succeed
While Others Fail? Group Centrality Constructs As
Predictors Of Project Outcome*

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The open source software (OSS) movement is changing the nature of the computer industry and is becoming an important factor in strategic and policy-level decision-making for many organizations throughout the world. An important and unanswered question about OSS is addressed by this on-going research: "Why do some OSS projects succeed while others fail?" In this study, social structural features of the OSS project community are investigated as possible predictors of successful project outcomes. Social structure is represented as the normalized group betweenness centrality (Everett and Borgatti 1999) of administrators and users within the communication network of the OSS project community. Two propositions are formulated with respect to "incubating projects" which are in an early phase of development. The first proposition - that low to moderate administrator group centrality is a precondition for the growth of incubating OSS projects - is based on OSS and community of practice studies which emphasize the importance of a low-key egalitarian style of leadership. The second proposition - that moderate to high user group centrality is a precondition for the growth of incubating OSS projects is based on studies of user-centered innovation and software development which emphasize the importance of central user involvement. Work is underway to test these propositions using data extracted from the SourceForge archives. With regard to other related domains, it is suggested that administrator (leader) group centrality may be related to the performance of communities of practice and other informal-emergent organizational forms, while user group centrality may be related to the effectiveness of new product development and innovation processes.

*Social Network and Genre Emergence in Amateur Flash
Multimedia*

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Research on digital media tends to characterize the emergence of new genres without reference to social networks, even though "community" and "social interaction" are invoked (e.g. Yates and Orlikowski 1992; 1994; 1999, Crowston and Williams 1997; Erickson 1997). How can a social network approach contribute to

the understanding of emerging digital genres?

To address this question, we examine the distribution of Flash animation genres on Newgrounds.com, a major web portal for amateur Flash. Since April 2000, Newgrounds.com has acquired over 800,000 users and over 280,000 flash animations, with several genres of Flash unique to Newgrounds.com (e.g. a "clocks" genre featuring inanimate objects with clocks for faces). First, we randomly sample 1000 Flash movies, and assemble a snowball sample by crawling "favorite flash content" and "favorite flash authors" links on authors' profile pages. We then correlate our genre classifications of the Flash animations with the network positions identified in an analysis of the snowball sample.

Preliminary results indicate that Newgrounds.com Flash authors exhibit a network with multiple cores, where each core is associated with a specific genre of Flash, to the exclusion of others. We argue from these findings that the social networks of Flash authors contribute to the establishment of genre norms, and that a social network approach can be crucial to understanding genre emergence.

*Teaching Swarm Creativity through
Social Network Analysis*

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Germany

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This presentation introduces a novel course teaching students how to optimize their online communication behavior. Students from Helsinki University of Technology and University of Cologne who had never met face to face formed virtual interdisciplinary teams collaborating on a common task. The task was to do a social network analysis of an online community such as the members of an online game, or contributors to Wikinews. While collaborating over long distance, students kept track of their own communication activities such as videoconferencing in class, and e-mail, chat, and conference calls with Skype in their individual teamwork. After successful completion of their projects, the students analyzed the communication behavior of their own virtual teams, based on their online communication records.

Students ranked the quality of their own interaction within the team. Each student team also ranked the quality of the work of the other teams. There was a significant correlation between the external ranking of

each team's output and the mutual internal ranking among team members. There was also correlation between communication frequency within a team and quality of team output. Finally, there was correlation between egalitarian communication behavior (low average actor centrality, balanced communication frequency) and team output.

Course URLs:

www.wim.uni-koeln.de/Distributed_Product.426.0.html

www.soberit.hut.fi/T-76.5651/indexEN.html

newclass.soberit.hut.fi/T-76.5651/wiki/index.php/Main_Page
(Collaboration Wiki)

WoW!: The dynamics of knowledge networks in Massively Multiplayer Online Role Playing Games (MMORPG)

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This paper presents the results of a longitudinal investigation of the co-evolution of social structures, behaviors, and attitudes of members of virtual communities formed by players of a Massively Multiplayer Online Role Playing Game (MMORPG) called World of Warcraft (WoW). Data were collected from 8 groups of participants in this virtual game at 3 time points in 2005. Each group had between 8 and 17 participants. Eleven network relations and over 50 attributes were recorded at each time point. The main objective of this study was to investigate the extent to which the dynamics of information retrieval, expertise recognition and "in-game" communication networks in MMORPGs reflect the same theoretical motivations that have been identified as explanations for the corresponding dynamics in "non-gaming" knowledge networks such as management consulting teams and research groups.

F3: Status, Wealth, Power and Control

Doing Gender in Networks; Power at Work

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Networks regularly feature as an explanation for gender inequalities in the workplace, although little attention to this issue is given in social network research. The studies that address gender find that the network structures that work to the advantage of men do not benefit women in the same way. The aim of the paper is to examine how perceived networks contribute to the persistence of gender inequality in organizations. The central questions are what differences exist between the perceptions of males and females about the importance of males and females in their network of most important business contacts and how networking processes bring about these differences. Two complementary theoretical frameworks of power are used, a more mainstream and a critical approach to power, to respectively describe the instances of power and the hegemonic power processes involved in networking. Data were collected through 39 semi-structured interviews in 20 organizations with both a female and a male account manager. The account managers have provided detailed information about how they develop, sustain and compose their networks. A variety of methods were used to analyze the material. Correlation analysis provides an answer to the first central question about the extent of the differences between perceptions of women and men. Discourse analysis is employed to answer the second research question and gain more insight in networking as a gendered power process. The findings indicate that women and men have notably different perceptions of the positions of other women and men in their networks. Furthermore, the discourse analysis reveals that women and men express similar ideas about females' flirtatious behavior as a networking resource for account management, while neglecting any reference to such behavior by males. These results provide grounds for gaining a deeper understanding of gender and networking as intertwined power processes.

Social Networks and Health Delivery in Rural Bangladesh

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Napier University

Edinburgh, Scotland

Women in rural Bangladesh are typified by low status, low literacy rates and high level of experience of infant

and child death. Maternal mortality rate is high, one of the highest in the world. There have been many attempts to intervene and improve the health of these women but their relatively poor health conditions persist, partly attributable to failure to make major improvements to their economic position. Data pertaining to the health variables, i.e. child mortality, place of delivery and type of delivery assistance accessed were collected in a survey of 724 married women in six rural villages who had at least one child. In addition, sociometric data were collected along with socioeconomic and demographic variables. Experience of own child death was modelled using binary logistic regression and it is shown that after controlling for the women's demographic and socio-economic situation the greater the connectedness to their social networks the less they experienced child mortality. Multinomial logistic regression was used to model the type of delivery assistance they got when giving birth. In these models social network measures of centrality appear as positive influences in explaining the type of assistance they receive. The higher is the connectedness of a woman, the higher is the likelihood of getting assistance from professional sources. Sociograms for example villages are provided to illustrate the importance of connectedness in the provision of health care. In terms of whether a medical centre is the place of delivery again social network variables have important explanatory power.

The Network Structure of Status Evaluations

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Reputational measures of the status of actors in organizational and community studies rest on sociometric data: peer assessments of one another, using standards such as influence or esteem. Though such data have a network design, they are rarely studied as network phenomena. Our analyses examine the network structure of such within-group judgments of the comparative standing of actors. We estimate statistical models for several status-judgment networks that incorporate variations in standing across actors (as targets) as well as variations among actors (as judges) in the propensity to allocate status. Following Gould's model (American Journal of Sociology, 2002) of processes involved in status attribution, we consider whether sociometric patterns commonly found in interactional network data, such as reciprocity and transitivity, extend to networks of status judgments. We contrast the structural tendencies found in networks of judgments resting on dyadic and global criteria.

Social Capital and Subjective Status: Evidence from China and the US

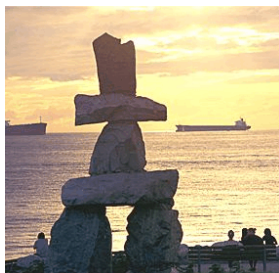
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Social capital is defined as resources embedded in social relationships, usually indicated by occupation and prestige of network members. Literature on status attainment has established social capital as a source of objective status attainment especially in the labor market. A gap exists in investigating the effect of social capital on subjective status. This article fills this gap, drawing the first wave data from the thematic research project "Social Capital: Its Origins and Consequences" in two societies, China and the United States. It measures subjective status as self-reported class. It employs generalized ordered logit model. Results show that social capital does have independent positive effect on self-reported class net of demographic factors and objective status variables mainly including educational level, employment status, and annual family income. These results apply to both the China data and the US data.

Evolution of Portfolios of Exchange Relationships: Patterns of Competition and Cooperation

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The present study contributes to the social network theory and embeddedness perspective by analyzing the role of competition and cooperation in the evolution of ego networks of repeat buyers of IT services as well as the impact of structural embeddedness on the allocation of new IT projects. We examine ego networks of repeat buyers at an online marketplace for IT services that facilitates matching of buyers and suppliers. Buyers post their requests for proposals (e.g. for web site development) and conduct reverse auctions or bilateral negotiations to identify winners. Buyers can procure new services either from their incumbent suppliers or new suppliers. Ego networks are defined as consisting of a buyer and suppliers with whom the buyer has direct ties, while ties are projects executed within a buyer-supplier dyad. We aim to answer the following key research questions: What are the patterns of the evolution of buyers' ego networks, particularly in terms of a shift from competitive and cooperative relationships (and back) with the suppliers? What is the impact of buyer's ego network structure on the selection of suppliers for new projects?



Friday Afternoon Part Two

<p><i>F4: Semantic Network Analysis</i></p>

Evaluating Scientific Classification Systems by Bottom-Up Clustering of Abstracts Using Semantic Network Analysis

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Jürgen Pfeffer and Harald Katzmaier
FAS.research,
Vienna, Austria

Scientific research and development is top-down clustered by the use of international standardized classification systems (e.g. Natural Sciences, Humanities ...). By conceptualizing science and the used vocabulary of concepts as a complex emergent system it could be expected that the structure of the research area is changing permanently. This leads to the question which parts of the classification systems don't fit any longer real world research? Which scientific areas actually now have blurred borders? Our presentation shows a way to evaluate top-down classifications of large numbers of texts and tries to characterize the European research space. The project on hand is based on semantic network analysis with AutoMap and FAS.net Software of the abstracts of about 2,500 projects funded by the European Union.

What comes into your mind if you think of food quality - Concept Mapping in Consumer Behaviour Research

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Kiel Germany

To gain insight into consumers' decision-making concerning food quality we analysed consumers' perception and evaluation with focus on their cognitive structures. In 2004 a consumer survey was accomplished with 260 face to face interviews. To uncover the cognitive structures the qualitative approach of concept mapping was

used. This paper presents practical results from the survey as well as methodological findings. The program used for the analysis is Ucinet.

Methodological Advancements for the Measurement and Visualization of Chat-Based Computer-Mediated Communication Networks

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This paper introduces methods for the analyses of communication networks from "chat-based" computer-mediated communication, as well as the measurement and visualization of these networks. Online (Internet) based interaction and community formation is growing exponentially and creating interesting and novel areas of research. However, chat data poses particularly complex challenges when trying to develop structural, network based indices of the communities that form in the chat-rooms since the data is stored as temporally linear chat-logs. The research in this paper covers processes for developing structural communication networks from chat interaction that can provide social network measures and visual representation. Additionally, the structural indices are presented in relation to semantic networks created using artificial neural network analysis of the content of the chat interaction. Integrated findings regarding the structure and content of the virtual communities catalyze a new method for the study of computer-mediated communication networks. An illustrative case study is provided through the measurement and visual representation of social networks created from the chat-interaction in a three dimensional, avatar-based educational online science community. Five different high schools across the nation are analyzed and compared. Findings indicate that the networks formed from these new methods accurately represent what the science community's creators report the actual social networks should look like. Additional findings concerning mentor centrality and student ability are discussed. Finally, limitations and future directions are offered.

F4: Algorithms and Analytic Methods A

Three Dimensional Blockmodeling

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Currently, there are two broad approaches to blockmodeling: conventional blockmodeling and generalized blockmodeling. This paper considers both approaches in an effort to apply blockmodeling to three dimensional network structures viewed as three-mode network data. Such data arise naturally in many situations and include the following: multiple distinct relations, indicator relations for some underlying relation, full three-mode networks (where the modes are all distinct), and temporal networks. The approaches to blockmodeling such structures that we propose and develop are fourfold: indirect methods, coupled direct and indirect methods, graph theoretical methods, and full generalized blockmodeling. While temporal three dimensional networks have the same logical structure as the other three dimensional network structures, they cannot be treated in exactly the same fashion because the inclusion of time introduces major restrictions. A formalization of the three dimensional blockmodeling problem is presented together with a formal statement of the methods for solving this problem. These methods are applied to a variety of real three-mode network data sets.

Computing Continuous Core/Periphery Structures for Social Relations Data Using MINRES SVD

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In previous work (Boyd, Fitzgerald, and Beck, 2005), we considered the discrete version of the core/periphery concept as formalized by Borgatti and Everett (1999) and compared alternative algorithms to those implemented in UCINET. In this paper, we extend this same consideration to the continuous model, where instead of being partitioned into distinct core and periphery subgroups, a

measure of 'coreness' is computed for all actors. Higher values of 'coreness' are associated with actors that have a high density of ties, while lower values reflect a lower density of ties. Continuous algorithms implemented in UCINET are compared to a new technique we have developed called minimum residual singular value decomposition (MINRES SVD), that uses Newton's method with line search and backtracking. Although MINRES SVD is not a computationally efficient as SVD algorithms, it has some important advantages. As compared to the CORR and DISTANCE algorithms in UCINET, it does not require diagonal values in observed data matrices, which we argue is inconsistent with the theoretical concept of a core/periphery structure. In addition, as compared to the UCINET MINRES algorithm, we are not forced to obtain 'coreness' values via symmetric pattern/structure matrices because row and column vectors are estimated independently, allowing us the ability to more consistently detect empirical examples of alternative core/periphery structures that may have important substantive interpretations.

Networks of Propositions: Applying the Robertson-Seymour Results to a Problem in the Social Sciences: Weakening Support for the Davis-Moore Hypothesis

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The logical relations among propositions can be graphed to form a network. This allows us to extend our analyses of the logical structure of theories and results of formal operations upon those theories (Robertson and Seymour 1990, 1983-1997; Diestel 1997). It can also improve our means of validating them. Where each vertex is a proposition, and each arc or edge is a logical relation of two propositions, it may be possible to prove that two propositions are equivalent. In that case, the two vertices can be contracted to one, and the edge can be removed. Then the second graph is a minor of the first. We can use this operation to fine tune our understanding of the theory and to sharpen our judgment of its truth value. A good example exists. Thanks to efforts to appraise the logic underlying the social stratification theory of Davis and Moore (1945) we can show better why scholars and students should approach it with great skepticism (see Tootell, Bianchi, and Munroe 2002) Similar examinations can be made of other formalized theories.

F4: Visualization B

Visualization of Affiliation Dynamics

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We propose a visualization approach for dynamic affiliation networks in which events are characterized by a set of descriptors. Examples of such networks are interlocking directorates (directors affiliated with company boards distinguished by industry sectors), scientific publications (authors affiliated with publications characterized by keywords), or terrorist networks (terrorists affiliated with cells characterized by activity). The method uses a radial ripple metaphor to display the passing of time and conveys relations among the different constituents through appropriate layout. Our method is particularly suitable when assuming an egocentric perspective, and we illustrate it on movie-actor biographies.

Network Mapping as a Diagnostic Tool: Adapting and applying SNA to the needs of rural development projects in Bolivia

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Rural development projects in Bolivia operate in a complex socio-institutional landscape, with interaction between community organisations, governmental, non-governmental and private sector actors who operate at local, regional, national and international levels. This inherent heterogeneity is further complicated by the tendency of donors to finance short-term projects which, along with the constant flux of public sector organisations and community leaders, limits the conditions for continuity and consolidation of successful experiences. This paper will present research into how Social Network Analysis (SNA) can be adapted and applied as a visual diagnostic tool to better prepare researchers and practitioners to face the challenges of planning and implementing rural development projects, by demonstrating institutional trends and tendencies, identifying similar initiatives to avoid duplication, and facilitating the building of social capital. Network sociograms can be developed at both community and organisational level, creating a model of local networks with which to identify the influence of and interaction between actors. Network maps are sensitive to literacy

constraints of some rural populations, making them suitable for discussion with all stakeholders with the aim of involving key actors in planning and implementation to improve participation and the likelihood of appropriation of project outputs by the intended beneficiaries. One and two-mode network maps of agricultural supply chains in Bolivia will be presented to demonstrate how the personal and whole network approaches of SNA have been adapted for use as a rough and rapid diagnostic tool with practical applications for rural development interventions.

Improving Interactive Exploration of Social Networks: A Rank-by-Feature Approach

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Social network analysis has emerged as a powerful method for understanding the importance of relationships among interacting units in a variety of domains. However, interactive exploration of social networks is challenging because: (1) it is difficult to comprehend the characteristics and structure of networks when there are many edges and nodes, and (2) current software applications are often a medley of statistical methods and overwhelming visual output which leaves many analysts uncertain about how to explore in an orderly manner. This results in exploration that is largely opportunistic. The contribution of our work is an interface that supports orderly analysis of social networks -- an approach that allows different analysts to arrive at similar discoveries. Our interface follows the rank-by-feature framework, where users can select an interesting ranking criterion (which we call a "feature") and all nodes and relationships are ranked according to that criterion. Users can quickly gain an overview of the distribution of all nodes, edges, and relationships. Users can also interactively break down a network into components, communities and ego networks, and rank these subgroups, too. Our approach enables users to better understand the structure of networks and the social groups within.

F4: Intra-Organizational Networks B

Social Network Analysis for Knowledge Management: An Organizational Case Study

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Elizabeth Warner
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This paper presents a case study demonstrating the effectiveness of social network analysis for knowledge management. The case study used survey data from one subdivision within a large consulting firm and integrated

standard social network analysis techniques to provide company management a useful mapping of the company's intellectual capital. Data on work relationships, experience, and functional capabilities was collected using a web-based survey and interviews. Block models clustered functional elements based on individual expertise into specific work roles within the organization. Network analysis, combined with the visualization of relationships at multiple levels (block, team, and individual), provided insights into problems with the geographic distribution of offices and work relationships. This analysis was later used by the firm's management to reconcile overlaps and define an investment plan based on the strengths of their personnel's intellectual capital.

Social network analysis to support business community management

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The aim of the paper is to investigate the use of network measures in the development of a model for business community management. Business communities are a special type of intra-organizational communities of practice that are created in order to support a set of business goals and therefore differentiate themselves from the spontaneous type of communities that are often found in the literature. The proposed model consists of six consecutive phases in a management loop: strategic planning, definition of governance, design, implementation and launch, operative support, assessment. In this paper 4 case studies are presented, each representing a business community. All communities are characterized by specific business goals and top-down approach. They present similar size (number of members involved) and high level of homogeneity in terms of members' background and job activities. The communities' geographical dispersion, managerial practices, and level of investment in technological facilities and editorial staff are also comparable. The study uses both qualitative and quantitative analysis. Data are collected through interviews with community managers and editorial staff and through direct observation of online activities. Communication flows (in the form of email exchange logs) are also analyzed. Preliminary findings show that selected network variables can be helpful in supporting different phases of community management. In particular strategic planning and community assessment seem to greatly benefit from the use of social network analysis techniques.

Creating and Shaping Social Networks in Organizations

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As organizational structures become more fluid and virtual, social networks represent how work really "gets done" in and between organizations. Organizations are

increasingly interested in the value of informal networks and the behaviors that shape those networks, yet there is a paucity of research on what behaviors create or shape these social networks in organizations. Theories regarding leadership of informal networks do not seem to exist. An understanding of network creation and network shaping is extremely important for organizations, as collaboration is required across functional, physical, hierarchical, and corporate boundaries. Information and Communications Technology (ICT) tools can support organizational networks; however, tools alone do not build effective networks. Knowledge seems to flow along existing pathways in organizations as people collaborate with those they know and trust. Research suggests that the main barriers to collaboration are the organizational boundaries, along with leadership behaviors and organizational processes. Research is needed to discover the beliefs and behaviors, from individuals and leaders that encourage organizational networks and a climate of collaboration. We suspect that relational behaviors will be the over-arching theme, behaviors that grow trust, support alignment of roles and responsibilities, and encourage a system-wide, boundary-less view of the organization. Understanding these behaviors will allow organizations to build networks that increase collaboration, thereby affecting innovation, communication, teamwork, knowledge transfer, human resource development, and organizational performance. The fluidity exhibited by today's organizations suggests that leadership effectiveness in the future may be measured on a leader's ability to lead a network—not a group or unit.

F4: Friendship networks

Re-visit Reference Group Theory and the Contrast and Assimilation Effect of the Big-Fish-Little-Pond

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National Chengchi University

A key purpose of our research is to get a thorough understanding of the impact of school and class context on an individual's self-esteem and academic achievement. Two effects of others' performance on an individual's self-esteem, contrast and assimilation, and different influences of reference groups are considered in the research model. The SEM analysis shows that the friendship networks have a negative effect on students' self-esteem and a positive effect on students' academic achievement. The influence of friends on students' self-esteem included both contrast and assimilation effects. Students will be proud of having an outstanding 'friend' but will feel stressed when being with outstanding 'friends'. Besides, class and school context didn't have significant impacts on students' self-esteem. From these results, we concluded that the nominated friends have the most significant influence on students' self-esteem (negatively) and academic achievement (positively).

A Relational Model of Behavioral Intention for Sharing Computer Software

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Organization Studies Dept,
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This paper investigates the effect of cognitive friendship structures on behavioral intentions. The cognitive psychological literature has ignored the influence from relational properties because it has assumed atomism or exogenous preference for behavioral intentions (Krackhardt, 1998). In this research, however, I will examine that ego's behavioral intention should be affected by ego's perception of relational influences. Specifically, I examine the impact of an ego's perception of her/his friendship structures on her/his behavioral intention for sharing computer software. Using ego-network analyses, for ego's perception of relational influence, I measured communication transitivity and value homophily in her/his friendship networks. To evaluate newly developed model, path analysis based on structural equation modeling is used. As hypothesized, perceptions of value homophily have significant effects as

predicting variables. Meanwhile, perceptions of communication transitivity among friends drive ego's intention to provide her/his computer software to others, but not to borrow computer software from others. Thus, relational influence functions differently dependent upon exchanging contexts – providing versus borrowing. The findings of this study have theoretical implications for integrating ethics and social networks fields: discussion between relational ethics and rational ethics.

Correlates of Social Isolation: Data from the 2004 GSS Network Module

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The number of people who say that they talk to no one about important matters has gone up dramatically in the past two decades (McPherson, Smith-Lovin and Brashears 2006). Here, we examine who these people are using new data from the 2004 GSS social network module. We explore socio-demographic correlates, voluntary affiliation structures, and internet usage patterns.



Saturday Morning Part One

S1: High Techification of Social Networks

Not All Networks Are Equal: "Friendship" Performance in Articulated Networks on Friendster and MySpace

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Ever wonder about those people with 9000 friends on Friendster or MySpace? There are people who have more friends than you, but not *that* many more friends. Social networking services like Friendster and MySpace require you to articulate your social networks. The assumption is that people will only connect to those that they know, however vaguely. In reality, that's not true.

People connect to others on the system for a variety of reasons. Some want to meet interesting people and think that friending will help; some want to be able to see more of the network when there are structural limitations; some want to feel cool; some simply want to collect. Of course, there are status rules to connecting. The dorky younger brother might want to connect to the suave older one, but the suave older one may not want the younger one hanging around messing with his impression management. But when relationships require confirmation, who's attitude wins out? Does the older brother concede because he doesn't want to deal with the whining at home? Does the younger brother get that he's simply not that cool? What happens when network connectivity offers privileges within the system such as basic visibility by friends- only on MySpace? In this talk, we will explore the politics behind the friending process

on social networking services, what different friendship connections mean and the implications that this has for social network analysis.

Our Lives, Our Facebooks

Fred Stutzman
University of North Carolina
School of Information and Library Science
founder of claimID.com

Students at a large number of American colleges and universities have come to rely on The Facebook (<http://facebook.com>) as a vital supplement to their social lives. A social connector website, Facebook serves the information needs of students who have perpetually in-flux social networks. As a result, frequency and penetration of student use is highly remarkable. In this presentation, a longitudinal analysis of Facebook use by freshmen at the University of North Carolina at Chapel Hill will be presented, with concentration on how students frame and share personal identity information in the website.

You are Who you Know

Orkut Buyukkokten
software engineer and product designer at Google,
received PhD in Computer Science from Stanford in
2002

We are all connected and the way we connect makes each one of us unique and unusual. Online social networks fundamentally change the way we get connected. The people we cross paths with have the biggest influence in our lives. Now it's easier to cross paths than ever as we are much closer and so much more connected. The possibilities are endless. In this talk I will explore the extent to which online social networking services build network connections.

Will Social Networks Transform the Business Enterprise?

Antony Brydon
CEO of Visible Path Corporation,
Prior to Visible Path, CEO of IUMA
graduated from Yale University with a degree in
psychology and philosophy

Recently, social technologies such as instant messaging, IP telephony and blogs have gained traction with consumers before achieving significant interest within business organizations. Shared characteristics of these technologies include

- * individual adoption and control
- * practical, tactical toolsets
- * engaging, simple user interfaces

The impact of enterprise adoption of these technologies is increasing levels of collaboration and innovation that flouts corporations' traditional hierarchical, top-down approach.

Social network technologies are following the same path, with companies such as MySpace, Friendster and

LinkedIn focusing on consumers, and companies like Visible Path translating the trend to professionals in business organizations.

But the social network needs of organizational professionals differ from, for instance, individuals seeking dates or job-leads. Privacy, trust and security are paramount. Senior professionals are often reluctant to put their life-long relationships in a public network, where they might be subject to marketing or advertising messages. And for many business applications, the strength of the network is in strong ties, so the ability to understand relationship strength is key.

In this talk, we will explore the use of social network technologies in business organizations and Visible Path's approach for building private, trusted social networks that help professionals understand which relationships are strong, which are weak, and how to use the information for highest impact.

S1: Academic Scientific Networks A

Modeling the SOcNET listserv: Its Structure and Operation

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We examine the structure of the SOcNET listserv as a vehicle to communicate ideas, ask questions and disseminate knowledge to others. We coded the postings of messages to the SOcNET listserv from May 2001 to May 2005. Each posting was classified by its communication type (announcement, question, etc.) and the content of its text. Specifically we created 37 high and 404 low level codes to categorize messages' text. We define a probability distribution for the SOcNET data and discuss the results of a series of probabilities. Examples of such probabilities include: the probability of receiving a response given the type of posting, the probability of a specific response type given the centrality (low, medium, high) of the responder and the probability of high centrality given the topic and type of posting. We discuss the results of our analysis and its implications on the direction of network based research. Additionally we show the inequality of contribution to types of postings and content areas. Ultimately we provide a clearer understanding of underlying mechanism in which the SOcNET listserv operates.

Co-authorship Network Structures and Successful Academic Publishing

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This research explores and describes co-authorship network structures in the academic publication process. The production of academic publications, through co-authoring choices or strategies, creates a network structure among co-authoring scholars which can influence research visibility and enhance stature among peers (Bayer & Smart, 1991). A specific scholar's co-authoring network may reflect a structure of more cohesion (Coleman, 1988) or one which fills more structural holes (Burt, 1992), both of which are theorized, from contrasting perspectives, to be associated with publication success. Therefore, this study examined the association of these two academic co-authoring network structures with publication success, specifically within the field of research and scholarship on higher education. The network population consisted of 810 academic scholars who published articles in at least one of four top-ranked higher education research journals. Based upon measures of structural holes and cohesion, seven different co-authoring network structures were identified. Findings indicate that while not all network structures were equally effective, co-authoring networks reflecting greater utilization of structural holes or greater cohesion were both associated with publication success. However, co-authoring relationships that leveraged structural holes were associated with academic scholars who produced the greatest number of publications. The implications of these findings are discussed and suggest that, overall, academic scholars who become more conscious of and more strategic in their co-authoring choices may be able to positively influence their publication success.

Making Invisible Colleges Visible - AI Researchers? Network Positions and Productivity

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This research focuses on the networks and productivity of Japanese artificial intelligence researchers. Using a web-mining technique to depict researcher's network from WWW (Matsuo et al., 2003), we have depicted the co-authorship, co-affiliation, and co-project-membership networks of Japanese AI researchers from 2003 to 2005. Analysis of these multiple networks and researchers' productivity indicates that (1) co-affiliation and co-authorship networks have similar structure, but co-project membership network does not,

(2) co-project-membership network serves as basis for developing co-affiliation network and co-authorship network, and that (3) betweenness score correlates with researchers productivity. Drawing on the findings we argue that invisible colleges can be made visible out of WWW with a text mining technology, researchers ties develop following a "co-project, co-affiliation, co-authorship" order, and that betweenness score should be a predictor for researcher's future productivity.

How Do Networkers Network?

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This study was conceived during the 2005 INSNA conference by attendees who were interested in the evolving patterns of relationships among social network academics and consultants, and in how junior researchers were being integrated into the existing community. The study was also intended as a session- and space-planning aid for the 2006 conference organizers. Specifically, this paper describes a study of networking among social network professionals who attended the 2005 INSNA (International Network for Social Network Analysis) Sunbelt Conference. The attendees were asked to respond to two rounds of surveys regarding their experiences. We obtained data on existing and new ties in the first round of the survey, and tracked the maintenance or decay of those ties in the second round (approximately nine months later). We employ homophily arguments as well as theories of status and career/life cycle to determine what factors led to the establishment of ties from interactions at the conference. We consider the content of the new ties in addition to the above-mentioned theories to understand why such ties decayed or were maintained in the post-conference period. As well as applying the results of this study to the understanding of social network dynamics, we hope our findings will further the integration of new members into the existing community and enhance the session-scheduling and space-utilization aspects of conference planning.

*On the way to Nobel prize:
What does the relational structure of laureates?
scientific collaborations look like?*

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What distinguishes Nobel Laureates from common scientists? The achievement of top-quality outcomes and outstanding reputation in academic research can be certainly made dependent on individual features such as scientific background, talent and ability to disseminate results. But what about ones own network of scientific collaborations? The extent to which a scientist has engaged in valuable confrontation and knowledge-sharing with colleagues and experts from other fields might indeed contribute to the probability of being awarded the prestigious prize, for at least two reasons: on the one hand, extensive knowledge networks increase the reputation and celebrity of a scientist; on the other, the sharing and joint development of new knowledge can increase the quality of ones own research achievements. This paper explores the Nobel laureates' networks of collaborations, in order to identify possible recurring features that can be taken as drivers of a successfully organized relational network. We focus on a particular network setting, i.e. the scientific collaborations held by Nobel laureates in Medicine and Physiology, prior to receiving the award. In order to describe the Nobel laureates' personal networks, secondary data were gathered using Nobel lectures, autobiographies, and lists of the major scientific publications of all the scientists awarded the prize from 1901 to 2005. An important part of the methodology adopted implies the use of social network analysis techniques, which allow us to identify and describe the ego-centered networks of Nobel laureates in order to verify whether similar characteristics among such networks can be found.

S1: Sampling methods

*Model-based Assessment of the Impact of Missing Data
on Inference for Networks*

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Most inference for models for social networks assumes that the presence or absence of all links in the network are completely observed, that the information is completely reliable and there are no measurement (e.g. recording) errors. In reality even if a census of a population is attempted, individuals and links between individuals are missed (i.e., do not appear in the recorded data). In practice, most social network analysis ignores the problem of missing data and treats only the com-

plete cases.

In this paper we use a statistical model for the underlying social network to allow researchers to make inference about the full unobserved network based on partial observation. We compare the inference for the complete cases to that obtained from the actual observed data.

The ideas are motivated and illustrated by an analysis of a friendship networks from the National Longitudinal Study of Adolescent Health. The impact of missing data on the analysis of these networks is rarely addressed.

*The effect of sampling on the structure of an
international airport network*

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We examine the effect of different sampling techniques on the resulting structure of a network of flight connections between over 4,000 international airports. We examine 3 types of sampling schemes: simple random sampling (SRS), non-random strategic sampling (i.e., selection of the largest airports), and the analogue of Respondent Driven Sampling (RDS). For each sampling technique we take 50 repeated samples of the network at each of 5 different sampling proportions; 75, 50, 25, 10 and 3. At each sampling level for each sampling technique, we calculate 3 major network characteristics: degree distribution, clustering coefficient, and average geodesics. We compare the network of flight connections resulting from the different sampling schemes and assess the robustness of this network's structure to data incompleteness and node isolation.

*Combining cluster sampling and link-tracing sampling to
estimate population totals of socially networked
populations*

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Link-tracing sampling is ordinarily used to sample hidden populations such as drug users. Different variants of this methodology has been proposed. One of them is the one proposed by Frank and Snijders (JOS, 1994) and another is the one proposed by Félix-Medina and Thompson

(JOS, 2004). In both of these variants the goal have been to estimate the size of the population. In this work we consider the variant proposed by Félix-Medina and Thompson (2004) and propose Horvitz-Thompson type estimators of a population total, as well as estimators of their variances. As examples of population totals we have the amount of money expended in drugs and the number of people who have received medical attention for their drug addictions, or more generally, the number of people who belong to some particular subpopulation of interest. One of the proposed estimators are based on the maximum likelihood estimator of the population size proposed by Félix-Medina and Thompson (2004) and other estimators are based on the "Bayesian" estimators of the population size proposed by Félix- Medina and Monjardin (2004). We present the results of a simulation study which show that the performance of the proposed estimators is reasonably good.

Flexible link-tracing sampling designs for networked populations

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Effective study designs for hidden human populations often require some form of link-tracing taking advantage of the social network structure of the population. Two questions for such studies are what form of design is best and what methods are then appropriate for making inferences from the sample to the wider population of interest. A flexible new class of link-tracing designs termed adaptive web sampling will be described in this talk. Design-based and model- based inference methods for these designs will also be discussed.

Sampling from hard-to-reach populations in graphs

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Sampling in graphs is one of the core challenges to graph theory that has been insufficiently addressed so far in relation to its importance. The basic problem is that in the various literatures, inference about graphs is made as if the data represent a realization of the entire graph. Instead, the data are usually a sample, which in many cases is selected in such a way that it is not at face value representative of the graph as a whole. So designs for sampling in graphs are fundamentally and theoretically important. Thompson (2004) constructed the Active Set Adaptive Sampling(ASAS)/web sampling designs and associated estimators. These designs and inference methods are particularly useful for studying populations related to "sensitive" issues like illegal drug use, HIV/AIDS risk, the Internet, and other network structures. When the sample size is large, the number of

permutations or recombinations of the sample data is extremely large and direct calculation of the Rao-Blackwell estimates become prohibitive. One way to get the improved estimators is to obtain the node sample paths from the conditional distribution given the minimal sufficient statistic. One approach is to construct a Markov Chain on the reordered sampled data. Our goal is to obtain representative samples from rare/hidden/hard- to- reach populations. This presentation provides a quick review of sampling designs including examples and three different resampling methods to obtain design based estimates and future work.

S1: Networks, Collective Action and Social Movements A

An Approach for Studying Online Networks of Nanotechnology-Opponents

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Nanotechnology - the science of technology development at the atomic level - is increasingly being used in a range of industries including food, textiles and agriculture. While nano-proponents emphasise benefits such as increased food yields and novel consumer goods, nanotechnology has also generated concerns about implications for population health and safety.

We expect nano-opponents to be active users of the Internet, a relatively low-cost medium with global reach that can facilitate the formation of global virtual communities (thus compensating for a lack of critical mass of activists in a given country). Web data will therefore be very useful for social science research into the mobilisation and coordination of anti-nanotech groups. However such data are vastly different in scale and nature to the data usually studied by empirical social scientists and

therefore require the development of new methods and approaches.

We outline a new approach for studying the formation and maintenance of online activist networks that draws upon methods from both the information and social sciences. This paper details our preliminary work on choosing key activist websites ("seed sites"), identifying networks via web mining for hyperlinks to and from these sites (possibly using network sampling methods), data cleaning, categorisation of websites and analysis of both network structure and web page content. Our approach will enable us to characterise online nano-oppositional networks to better understand their composition, how they have formed and their evolution over time.

Embedded networks and the growth of voluntary associations: Packing a Wallop

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Lei Gu

What are the keys to community growth? One prominent explanation emphasizes the importance of pre-existing social networks. This study draws on rich longitudinal data from an online discussion system to investigate the relationship between social network structure and the differential growth of community in voluntary associations. We compare the volume and structure of invitation and participation between two subgroups: an initial core of predominately English language speakers and an emergent and rapidly growing population of Chinese language speakers. We hypothesize that the substantial differences between the groups in size, rates of growth, invitation rates, success rates of invitations, and levels of activity are related to how effectively each group drew on pre-existing social networks. Visualizations of network structure prior to, during, and after the period of meteoric growth in the Chinese language population (CLP) reveal substantial differences in network structure between the sub-populations. Analysis of clustering, density, and path length statistics in the interaction network shows a clear relationship between connectedness, activity levels, and community growth. These results, combined with a comparison of the invitation and interaction networks, suggests that the CLP drew on preexisting

social networks more effectively. We conclude by considering implications for participation in and growth of communities of collective action and the role of computer mediated data in that research.

Movement-Countermovement Interaction: Dynamic and Structural Modeling of Participation

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Although a number of studies have analyzed the effects countermovements have on social movement participation, few present the reciprocal interaction between the two. This study puts forth contentious situations whereby movements and countermovements systematically differ only in regard to rivaling interests. Each of the two sides in a contentious situation has four primary tasks: production of a collective good that benefits the interests of ego; recruitment of participants to produce such a benefit; prevention of collective goods benefitting rival interests; and prevention of those with rival interests participating. To predict the successful completion of each of the four tasks I use agent-based models developed in light of Kim and Bearman (1997) in which interdependent actors influence both the interests of their neighbors and the choices they make of whether or not to participate on behalf of their interests. This model examines the effects of network and other structural properties on movement/countermovement successes over time. The study at hand aims to enlighten prior theories of collective action participation while producing a general theoretical account for the effects movements and countermovements have on each other.

What are they really talking about?

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Donna Mergler

Participatory research conducted during more than 10 years by Brazilian and Canadian scientists jointly with a riverine population of the Tapajós in the Brazilian Amazon have led to a deeper understanding of the problems related to mercury contamination. Since 2001, network analysis conducted with this population have shown that there exist extensive discussion networks on the themes of health, mercury and fish consumption. This is good news in terms of "diffusion of information" and in terms of empowerment.

But, what network analysis doesn't show is the content of these discussion: what are people really talking

about? Have they really grasps the complexity of the problem? Do they relate or integrate the information receive by the scientists to their view of the world? In other, how do these discussions contribute to the construction of their knowledge?

In order to answer those question, we conducted qualitative research, using nine discussion groups re-grouping people from 21 communities of the area and we will be presenting some of the results in this paper.

The Emergence of Nanotechnology-Opponents in Online Environmental Networks

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Using content and hyperlink analysis, we assess how the emerging nano-opposition movement is positioning itself in online environmental networks. We first characterise the size of the online nano-opposition movement, based on the importance within each node of the nano-opposition theme relative to other environmental issues, from groups focusing solely on nanotechnology to others embracing a wide range of issues. In the process, we identify a specific nano-op-position dialect. This in turn leads us to suggest that certain groups are attempting to frame the nano-technology debate by systematically employing negatively loaded tems (such as "atomtech" for example). We track the spread of such key words over the online environmental network to determine whether these efforts are succeeding.

Since opposition to nanotechnology is a relatively new issue in the environmental movement, it is to be expected that there will be significant differences in hyperlinking strategy between different groups, attributable to the length of their presence in the network. Relatively new entrants focusing solely on opposition to nanotechnology are likely to want to legitimise this core issue by establishing dense patterns of interlinking, as well as strong connections to related issues, such as the contestation of biotechnology. In contrast, we posit that more established groups with a wider thematic repertoire will be less likely to link to such new entrants, because they are liable to feel that their dominant position is being challenged, or that nanotechnology represents a distraction from more pressing or fundamental concerns. We test this hypothesis by conducting statistical analysis of the hyperlinking behaviour of environmental groups.

S1: Social Capital.

Social Capital Networks, Relational Schema and the Macro-Distribution of Power: The Japanese "Butterfly State" in U.S. and German Comparison

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Studies of the locus of political power in the state-society matrix typically conceive of it in some variation of class, bureaucratic or interest group models emended by corporatism, fragmentation, organizational clustering and ideological hegemony. This paper reveals the importance of a neglected dimension of power – the social relational infrastructure. This infrastructure consists of the social relational (based on mutual recognition, not quid-pro-quo exchange) patterns typical among organizations. The research analyzes empirical network data on three networks (information, political support and social capital) among about 130 organizations (in state and society) engaged in labor politics in Japan, the US and Germany. The findings reveal important information and political support networks in all three countries. But the third network, social capital, varied greatly: virtually absent in Germany and present only among labor organizations in the US. But very inclusive, dense and macro-patterned in Japan, correlating strongly with information transfer and influence. The presence of a social capital third-party raised this correlation. At the macro-level, Japan's social capital network took the shape of a "butterfly." Ministry of Labor agencies bridged a "structural hole" between two "wings" composed of labor and business organizations respectively. The social capital networks and their butterfly pattern help explain the persuasive capacity of Japan's developmental state. Their absence indicates where and why that persuasive capacity fails.

Web Capital: A Network Approach

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The web capital of social actors is defined as constructed by the set of web pages that link directly to a web actor's site, by the pattern of web linkages, and by the diversity of domain types among the set of social actors. Linkages on the web are a representation of civil society and social capital in cyberspace, just as voluntary associations among social actors offline define civil society and social capital there. The higher the web capital: 1) the greater the number of direct links to a social actor's web site, 2) the lower the density of the network of the

linked sites, and 3) the greater the diversity of top-level domains. Measurement of web capital can begin with use the Google advanced search option "link:" to find all pages linked to a focal web page. To measure the density of the network these pages can then be input to www.issuercrawler.net. The links serve as starting points in a web crawl that identifies all pairs' web sites that have at least two co-links. Appropriate parameters for the crawl are: one iteration, a crawl depth of 2, using pages as the unit of analysis, and privileged starting points set to on. To demonstrate the procedures, all web pages directly linked to either www.insna.org or www.sfu.ca/~insna were located with Google advanced search option "link:." The insna.org site has 74 direct links, while the old sfu site has 166 direct links. Inputting all of these links as starting points for Issuercrawler results in a network of 129 web sites that have at least two co-links among the sites in the starter set. Density of the network is .033. The distribution of domains is: 48 .com, 27 .org, 25 .edu, 6 .net, and 13 others. To assess the web capital of a site, one would compare it to others in the same social category and normalize the three components of web capital. In the social category of professional associations, one would divide the component values by the membership size of the organizations, and then compute z-scores for the three components of web capital.

The contributions of individuals to social capital: The role of values and friendship

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In this paper I consider how individuals are perceived to be contributors to social capital at the group level. It is proposed that there are two kinds of factors that affect how an individual's contributions to group (as one kind of collective-level) social capital are perceived by others. The first set of factors relates to individual-to-individual ties and particular attributes thereof. The second set of factors relates to how an individual is positioned within a group; in short, whom is the person within the group tied to? Two individual-to-individual factors—ideological homophily and philos ties—are specified, as are two individual-to-group factors—whom the individual is tied to in the group (a kind of network centrality) and network size. Six Episcopal Church vestries (governing boards of local Episcopal Church congregations) in a midwestern Episcopal diocese in the United States participated in the study, with a total of 32 respondents. Generally, the hypotheses regarding perceptions of individual contributions to collective-level social capital received empirical support. People rated their friends and ideological allies higher than others for contributions to collective-level social capital. Further, individuals who were thought to have lots of positive relationships with others were rated higher than individuals with fewer

such connections, and group size moderated this relationship. This study suggests that some level of relationship length and commonality of values might have salutary effects on both individual contributions to collective-level social capital and collective-level social capital itself. Implications for future theoretical and empirical research are offered.

Social capital across contexts: strategies for theory and research

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Research on social capital faces challenging problems in generalization, because there are great variations in the kinds of network features that produce desired outcomes. The variations and challenges are great even if we restrict attention to one important kind of social capital, network diversity as measured by some kind of position generator. Drawing on social capital research done in different societies and in different contexts within societies, this paper discusses and assesses different strategies for measurement and theorizing. The different strategies include use of identical measures versus theoretically equivalent measures adapted to different contexts, and, the use of different kinds of "positions" in the position generator such as alter's occupation (the classic original choice) and/or gender, ethnicity, and organizational locations.

Position Generators, Affiliations, and the Institutional Logics of Social Capital: A Study of Taiwan Firms and Individuals

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We seek to identify institutional logics from a study of position generators and voluntary affiliations of individuals in Taiwan organizations. We build on existing theory and research on social capital and position generators in vital sectors of the Taiwan economy. We employ graphical techniques, dual clustering, and generalizations of structural equivalence in order to understand the typical ways in which people within organizations make use of the structures (both formal and informal) in which they are embedded. We refer to these typical modes as "institutional logics." Our focus in this paper is on methods for relating social capital theories to data on organizations.



Saturday Morning Part Two

S2: Networks and Emotions

Energy Networks

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The need for resources is one of the fundamental reasons why people interact. Following Collins, we propose that “energy” is also a fundamental reason why people interact, with implications for the use and loss of information in organizations. We use agent-based modeling to simulate energy in networks, based on empirical findings from previous studies of energy networks. We show that positive energy aids the transfer and dissemination of information, while negative energy leads to information loss in organizations. By experimenting with the implicit rules that individual agents use, we identify how organizational networks experience high or low levels of information use, energy, and overall effectiveness. In the process of this study, we also validate energy as a distinct dimension of relationships, separate from liking, trust, and other types of tie.

Through a Flawed Lens: Explaining Tie Formation Through Affective Meanings

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It is long-established that one of the most relevant determinants of tie formation is whether or not individuals have an opportunity to form such a tie. However, while such influences on tie formation are well-understood, the literature has less to say about which ties form once individuals come into contact. As a step towards answering this question we adapt Affect Control Theory (ACT) as well as the concept of parallax, or the apparent shift of an object against a background due to a change in observer position, to explain the likelihood of tie formation. Using the E.P.A. measurements developed and used by the ACT tradition to test affective meanings within social space, we construct a perceptual space

referred to as a “Heise metric.” We hypothesize that the apparent, but not objective, similarity of individuals within the Heise metric will depend on their positions relative to each other and to the judging party. The benefits of this approach are twofold. First, it will allow us to explain where persistent concepts of interpersonal similarity derive from, greatly improving our ability to predict tie formation. Secondly, it will help explain how a single persistent social world can be regarded so differently by categories of individuals positioned differently within it. Preliminary data based on an ongoing research project will be presented.

Emotional Activity around Structural Holes

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A growing body of research documents the returns to network brokerage. People whose social networks span the structural holes between groups are, relative to peers, at higher risk of good ideas and more likely to enjoy positive job evaluations, high compensation, and fast promotions. With belief and practice more homogeneous within than between groups, people whose networks span the structural holes between groups are exposed to heterogeneous belief and practice. Such people, the “connectors” or “brokers” in a network — have a social capital advantage through information arbitrage to identify and develop rewarding opportunities. While we know quite a bit about the association between achievement and networks rich in structural holes, we know little about the emotions that accompany, facilitate, or inhibit the association. The image of a neutral third party serving as “honest broker” between groups implies that emotion could inhibit brokerage. There is tension where conflicting ideas and understandings meet. Emotional neutrality could be an advantage in coordinating inconsistent understandings between groups. On the other hand, emotions could facilitate brokerage in that emotion is the substance of appeals to friends in separate groups, appeals to identity shared by the groups, or appeals to past events that brought people together from the groups. More, there is evidence that positive emotions are associated with creative problem solving and successful appeals to people scattered across groups. In other words, positive emo-

tions have creativity and performance correlates similar to the documented returns to network brokerage. How are returns to network brokerage enabled by, or perhaps due to, emotions? Using data on the informal discussion relations between managers in a large company, and software established in psychology for inferring emotion from text, I analyze the words managers use to describe their best idea for improving the value of their work. I find six associations with network structure: (1) Brokers — the managers whose networks span structural holes — use more words. (2) Brokers are more likely to use emotional words. (3) The words brokers use are neither more positive, nor more negative, but both. Brokers are more likely to invoke positive and negative emotions in describing their ideas. (4) Brokers are not being evasive or ambiguous so much as they are using a wide emotional aperture in pitching their ideas. Individual sentences are homogeneously positive or negative. The brokers are different for their tendency to include sentences that are positive along with sentences that are negative. (5) There is sequence to the emotions. Though network brokerage remains the primary predictor of perceived value, introducing an idea with positive emotion words increases the likelihood of an idea being perceived as valuable. (6) Negative emotions seem to be irrelevant. They have no association with perceived value, directly or in combination with positive emotion. In sum, the results reported here are consistent with past research describing the returns to network brokerage, but extend that work to describe a role for emotions in successful brokerage. At the same time, the results are consistent with emotion research in psychology. That work is extended in linking emotion to network brokerage and its association with performance.

Social Identity, Social Networks, and Conflict

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Conflict based on social and demographic differences is arguably one of the greatest problems facing society today. For organizations seeking to fulfill broader social change mandates, successfully managing diversity presents an enormous challenge. Not only do individuals tend to prefer people with whom they share a category membership, such as race or sex, they also tend to be biased (or even hostile) toward people with whom they do not share a category membership. Under what conditions, then, will individuals from different social categories develop more positive – or less negative – relationships with each other? In this paper, I explore the factors that influence the formation and dissolution of negative relationships between individuals from diverse social categories using insights from research and theory on diversity, social networks, and social identification processes. I hypothesize that the level at which individuals identify

with different social or demographic categories (e.g., race/ethnicity, sexual orientation) interacts with their position in the social network to determine both the formation and the amelioration of negative social ties. Network and attribute data were collected from individuals completing a one-year term of service at a social service organization. Preliminary results are provided and implications for theory and practice are discussed.

S2: Algorithms and Analytic Methods B

Fuzzy, Overlapping Groups in the Enron Email Corpus

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Emails are often analyzed as dyadic communications, but many pass through more than two recipients, forming a shared information context for those who see the message. We present a new analysis of the Enron email corpus based on multi-party links reflecting shared contact with email text, rather than individual send/receive transactions. Using these rich links, we derive fuzzy, overlapping groups, where individuals are permitted multiple group memberships of varying degrees. We demonstrate our methods with a fresh analysis of the Enron email corpus. The structure of these groups yields new insights into formal and informal segmentation of knowledge in a company going through a crisis.

Determining Networks as Opportunity Landscapes - From EGO-Networks to Egocentric Network Profiles

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The paper introduces the notion of egocentric network profiles. While EGO-Networks take into account the 1-step environment, ego-centric networks capture structural features of the k-step environment ($k = \text{length of the diameter}$). An egocentric network profile is defined as the inverse weighted number of n-stars, 3-rings, squares, 4-rings and the amount of entropy in the k-step neighborhood of each individual agent. Using different types of networks (poisson networks, power-law networks) the obtained information on the structural environment of each individual node is compared to other network measures at the nodal level (centrality measures, CCI, CC2). Finally by the example of some real world networks we want to demonstrate how egocentric network profiles can be used to model the opportunity space of an economic agent.

Identifying Leaders using Email Transaction in an Organization Network

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Email flow has been used to construct a social network for network analysis. One interesting problem is to identify the set of potential leaders using the given email flow. Krebs showed that leaders can have high degree, closeness, and betweenness centralities. Later works further combined these centralities to compute a power score that indicates how well a node controls another node. However, these metrics may not be applicable in an organization network. In particular, a high-level leader usually does not directly send email to the low-level employees. Furthermore, auto-generated mailers such as event announcement/reminder usually have very high centralities, but they cannot be classified as leaders. In this paper, we propose a new approach to identify leaders based on a new centrality --- 'respectedness' centrality. We determine how well a node B respects another node A by the spontaneousness of B's replies to A's emails. If A is highly respected by a sufficiently large number/percentage of nodes that A connects to, then A has a high respectedness centrality and can be a potential leader. An immediate advantage of this approach is the removal of the influence of spam and auto-generated emails, as the senders of these mails usually receive no reply, and thus are lowly 'respected'. Our experiment on a company of thousands of employees verified this hypothesis. Our method can identify the leaders of various departments, including both organizational-wide departments such as administrative department, as well as regional departments.

Methods for the identification of community structures in social networks

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The community structure is a property found in many networks where some nodes form clusters in a way that the relations existing within each cluster are denser than the relations existing between nodes belonging to different clusters. This paper proposes a comparative analysis of methods for the identification of community structures in social networks. Our study identified 17 different methods, most of which have been developed in the last few years. The methods are then grouped in 5 different families and are evaluated upon a series of criteria, among which the possibility to identify fuzzy communities (where nodes can have a partial belonging to one or more communities) and the existence of algorithms and software that implement the methods. The paper also explains the use of modularity to assess the effectiveness of each method.

S2: Small World Research

Personal network size and variance: Evidence from a position generator

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The size of personal networks is a critical variable for modelling 'small world' probabilities of population connectivity. It is also a crucial aspect of social capital theory and of studies of sociability and social circles. In order to extrapolate network size measures from survey data we also need to know about the variance of personal network size (degree in graph theory terms). If this degree distribution is 'scale free', as claimed by Barabasi, normal extrapolation procedures will not work. This paper reports on a large (n=2880) survey of social capital in coastal British Columbia coastal communities. Personal network size was measured using a position generator to have respondents nominate the number and type of the contacts. We report on the quality of data gathered by this technique for measuring personal network size. We also map the variance of personal network size to assess whether or not there is a scale free degree distribution. Finally we examine differences of personal network size between men and women.

The Fortune Global 500: A Very Big Small World

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This paper examines the economic and spatial integration of transnational corporations over the past thirty years, as evidenced by interlocking directorates of the Fortune Global 500 corporations. Two findings stand out. First, these corporations are indeed highly integrated by their boards of directors-- nearly 90% of the Global 500 are linked in five steps, forming what Watts (2003) refers to as a "small world". Second, this integration is not uniformly distributed geographically. While the geographic location of the global 500 corporations has become less concentrated over time - with increasing numbers of these companies now located outside the "Global North" -- the integration of these TNCs remains primarily a North Atlantic phenomenon. The implications of these findings are discussed.

On Measurement, Moreno and Milgram: Thinking about the Foundations of Network Science

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Periodically, SOCNET flares into debate about the general status of SNA and particularly its disciplinary relationship within the developing science of networks, for example, 'SNA is not a method' (January 2006). This paper approaches the issue of the status of SNA from the narrow, yet crucial, perspectives of elicited data quality and experimental replication. The purpose of the paper is to set out a rigorous schedule for data collection in future Small World experiments so as to ensure comparability of results. Initially, reference is made to Moreno's 'Sociometry and the Cultural Order' (1943) which explores both the place of measurement in sociometry and its characteristics as a science. Findings from a replication of Milgram's Small World carried out in Wales (UK) are then reported. Consideration of these findings leads to a critical appraisal of the data collection tools that are central to the experiment. This critique develops that of Schettler (2005) and poses two key interrelated questions. "What do and what should Small World experiments demonstrate?" As a response to this question, a standardised research design is proposed.

The accuracy of small world chains in social networks

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We analyse 10920 shortest path connections between 105 members of an interviewing bureau, together with the equivalent conceptual, or "small world" routes, which use individuals' selections of intermediaries. This permits the first study of the impact of accuracy within small world chains. The mean small world path length (3.23) is 40% longer than the mean of the actual shortest paths (2.30), showing that mistakes are prevalent. A Markov model with a probability of simply guessing an intermediary of 0.52 gives an excellent fit to the observations, suggesting that people make the wrong small world choice more than half the time.

*S2: Criminals, Gangs, Terrorists, Networks**Vulnerability and Disruption in Criminal Networks: A Case Study*

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This study focuses on the structure and evolution of a drug importation network that was the target of an extensive two-year criminal investigation in Quebec. The investigation was atypical in that while drug shipments were consistently seized by the police during this period, arrests were never made until the final phase. Such a case offers a rare opportunity to study the dynamics of a criminal network under heavy surveillance. The reconstruction of the network is based on electronic communication transcripts that were intercepted and compiled during the investigation. Three findings emerge from analyses of the principal changes that took place within the communication network that connected participants within the importation network. As law-enforcement monitoring and manipulation persisted and intensified: 1) the network structure became increasingly decentralized; 2) network density increased during the most volatile periods; and 3) the positioning of initial key participants were radically transformed as they were held accountable for the accumulation of losses. These findings reflect the re-ordering of a criminal network in response to such intense targeting and contribute to recent research on vulnerability and disruption in criminal networks.

Testing Balance Theory: Examination of Gang Networks of Rivals and Allies

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This paper will explore the application of balance theory as an attempt to understand the observed social ties among urban street gangs in Long Beach, California. More specifically, we are interested in answering the following questions: Considering the enemy and ally relationships as negative and positive ties respectively, is balance theory able to explain the signed graph structure

as it is? Are the gangs situated in a balanced network, meaning that the tensions between the gangs are reduced and some stable state is achieved? Unlike most empirical studies on balance theory, which mainly focus on positive ties, and a few signed graph studies where the intensity of the negative ties is at best “mild”, the present study provides a rather evocative context to test balance theory as negative ties can lead to fatal incidents. Hence, it is possible to suspect a strong tendency for the gangs to move towards balance. Our data come from Long Beach Police Department. The network data identifies the rivalry and ally relationships among 40 known gangs in Long Beach. We also have attribute data for each of the gangs including the race/ethnicity of the gang (Latino, Asian, Pacific Islander, Black, mixed), the number of members in the gang, and the geographic location of each gang. We start our analysis by exploring whether the probability of balanced triad in the network is higher than by chance, suggesting that the gangs are likely to be embedded in balanced relationships.

Looking for the power in “secret” terrorist networks

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The relative with which the September 11 and March 11 terrorist networks were detected, uncovered and visualized (V. Krebs, 2001; J.A. Rodríguez, 2005) raise the doubt of whether we are really seeing and analyzing the true terrorist network or merely an expendable part (generated by a really “secret” network). It would seem that terrorist networks should be “secret” (given their objectives) and as a consequence the identification of all their members and relations should be problematic. There is no doubt that the work uncovering them (at least part of them) has moved our knowledge substantially ahead. However, here we want to discuss to what extent we could identify an underlying, and therefore more secret, network which would fit better the idea of secrecy. As we already pointed out in our previous paper on the March 11th network, we could perhaps find an underlying (rearguard) network in the structure created by indirect relations. This might be the one holding the network together and alive, as well as the one responsible for creating action (often expendable) networks. In this framework, the network rising from direct (and visible) relations would be seen as a weak network while the one rising from indirect relations (much less visible or traceable and even difficult to be persecuted) would

be the real and powerful secret terrorist network. In this paper we analyze and compare the direct and indirect networks attempting to assess their organizational forms and whether the similarities and differences rely on different objectives and functions. To study the role played by this indirect network as well as its power we analyze the relations between both networks, and between the central actors in the indirect network and the action network. We will assess to what extent it is really powerful in maintaining a live network even after detection and arrests.

To this purpose we will use relational matrixes based on public and police information, collected between 2003 and 2004, about 250 individuals related to the March 11 terrorist attacks in Spain.

On Effectiveness of Wiretap Programs at Mapping Dynamic Covert Networks

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On December 16, 2005, a New York Times article has revealed that in the immediate aftermath of the September 11th attacks, the National Security Agency has began a broad program of domestic signal intelligence collection. As press reports indicated, NSA proceeded to implement its collections program based on the snowball sampling methods, which is generally used in surveying hidden populations and networks. However, snowball method is known to be a biased toward highly connected actors and consequently produces core-periphery networks when these may not necessarily be present. In case of terrorist networks, the last statement is particularly important in light of the “smoking gun” arguments presented by the government. In a further argument, the government argues that wiretaps on suspect terrorist operatives need to be put in place extremely fast and in large quantities, thus overloading the FISA court system. In the use of snowball sampling, overload of information collection system does present a distinct problem due to exponential growth of the number of suspects to be monitored. In this paper, we will focus on evaluating the effectiveness of the wiretapping program in terms of mapping fast-changing networks of a covert organization. By running a series of simulation-based experiments, we are able to give a number of information gathering regimes a fair evaluation based on a consistent criteria. Further, we propose a set of information gathering programs that achieve higher effectiveness than snowball sampling, at a lower cost.

S2: Qualitative Approaches A

Qualitative Network Science

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Network science is commonly perceived as a collection of quantitative methods, yet in fact it is a very rich paradigm that offers much more, one dimension of which is the deployment of qualitative methods to study social relationships. The Manchester anthropologists (John Barnes, Clyde Mitchell, Elizabeth Bott, and Siegfried Nadel) are well-known for their qualitatively-informed writings on social networks. More recently, numerous ethnographic studies have shown the power of qualitatively-oriented network science for uncovering the complexly powerful ways in which networks structure social interaction. One distinctive feature of these qualitative studies is a focus on the fluid and unbounded lived reality and underlying dynamics of social relationships. In this presentation, we will briefly discuss the historical background of qualitative network science and then quickly move to overviewing an exemplary set of recent works. Our review of this dimension of network science will show the distinctive ways in which qualitative network science is practiced and some theoretical fruits of this enterprise. We end by discussing promising trends in qualitative social network analysis.

Networks, Actors, and Meaning. Contributions of Qualitative Research to the Study of Social Networks

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Of the traditional criticisms of social network research, especially two remain prominent: the problem of agency and the question of network dynamics (Borgatti/Mehra). The paper discusses how qualitative research may contribute to the study of social networks, especially how it addresses these current challenges.

Whereas the concept “social network” is relational, focusing on the structure of relationships between actors, qualitative methodology and the “interpretative paradigm” (Wilson) is actor-oriented, focusing on single actors, in particular, these individuals’ perceptions and interpretations, actions, and sense-making practises. With this approach to social action, qualitative research

and its methods offer special tools for addressing challenges faced in network research, namely to explicate the problem of agency and linkages between network structure and network actors as well as questions relating to the constitution and dynamics of social networks.

The paper addresses these potentials of “qualitative network analysis”: After a brief overview on the subject matters and procedures of qualitative research – that shows the common basis of such different methodological positions as Symbolic Interactionism, Ethnomethodology, or Phenomenology – the contributions of qualitative research methods for the study of social networks are discussed and systematised. These are: exploration of networks, network interpretations, network practises, and network dynamics. These contributions are illustrated by recent empirical case studies from different fields of sociological inquiry (family, migration, organizations). Finally, the paper presents a synopsis of the qualitative techniques of data collection (e.g. narrative interviews, expert interviews) and data analysis (e.g. content analysis, hermeneutics), which are tools suitable for use in network studies.

Footings, Frames, and Relations: The Interpretive Origins of Networks

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This paper explores how relational dynamics are constructed by actors symbolic efforts. Using a sample of over 3000 interpersonal notes between adolescents, this paper explores the footings and textual moves actors use to communicate desired relational changes. Factor analysis and correspondence analysis are used to identify how textual moves relate to interpersonal intentions or frames. For example, what goes into a breakup note that differentiates it from a breakup note? What goes into a fight note or a dating overture note? How are meanings used to persuade others of a relational definition? Several interesting finds are made. First, Goffman's footings are base elements of more abstract efforts at relational definition. Second, footings often entail network forms of alignment which expand current notions of graph theory, relating node to arc (*A* dislikes arc *AB*), and arc to arc (arc *AB* contends with arc *BC*). This paper reveals how social actors think and communicate about relations in a complex, strategic, and interpretive fashion that calls for a revision of social network theory and greater focus on the normative order of human communication. It takes adolescent notes and analyses how they talk about relations and how they talk about changing them (persuasion efforts). In addition, it looks at how different friends of an ego, convey different kinds of network knowledge (cognitive network info).



Saturday Afternoon Part One

S3: Network Theory

A plea for consistent terminology for personal and social networks

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Consensual terminology is required for clear communication in any scientific field, especially for the most fundamental concepts. In recent years, researchers have introduced many new adjectives to refer to personal networks (e.g., local) and social networks (e.g., complete, global, sociocentric, sociometric, and whole). In this brief presentation, I discuss desirable properties of scientific terminology and argue that each of the new terms is superfluous and misapplied. I conclude by suggesting that any mention of the new terms should at least involve explicit cross-referencing with the established terms, and that abandoning the new terms altogether in favor of the established terms would be even better.

Comparative Network Analysis and the Development of Network Theory

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A great deal of recent interest has centered on the extent to which there are universal organizing principles in networks including, for example, the world wide web, cells, proteins, genes, food webs, and human societies. However, although network data of various kinds are becoming increasingly available, to date there has been a reliance on a relatively small number of network data sets in investigating the possible empirical consequences of such principles. Additionally, sufficient numbers, or replicates, of specific types of networks are required in comparative analysis to be able to adequately address

issues of degrees of freedom and better assessments of theoretical assertions. It is common in social network-oriented research to use single case study design or simply a single static network. Thus, a single case social network (an organization) at one point in time would be studied in an attempt to test some theoretical proposition relating an aspect of network structure to some outcome (or visa versa), a fundamentally macro level problem. But the ability of the single case study to provide an adequate test must be called into question, thus impeding our ability to both develop and validate macro level theories in the study of social networks and to discover potential underlying organizing principles of human networks more generally. This paper discusses the importance of developing a comparative network approach to aid in both the development and testing of social network theories. Several examples are provided that illustrate the importance of various types of comparative forms in the development of theory including comparative experimental, comparisons of experimental tests with real world tests, dynamic comparisons and cross-cultural comparisons.

Automatic Modeling of Social Networks through Content Analysis of Communications

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Questionnaire has long been a standard data collection method for social network studies. In order to investigate social networks, e.g., communication network, advice network, access network, trust network, etc, researchers need to issue questionnaires to subjects and rely on the subjects' memories for answers. Usually, this process is time- and resource-consuming. It is also very

difficult to get timely updates or capture evolutionary patterns. We focus on developing novel technologies to automatically sensing subjects' behaviors and relationships through their communication records. For instance, content analysis of emails can be used to study the topics that Person A usually discuss with Person B. It can also be used for modeling and predicting from whom a person receives advices. We can thus be able to automatically model the information dissemination flows in network. Because our network models "who talks to whom about what," if we distribute a message to a person, we may be able to predict who else may get informed. We generate a personal profile, called Community Net, for each individual based on a novel algorithm incorporating contact, content, and time information simultaneously. Clusters of CommunityNets provide a view of informal networks for organization management. We tested CommunityNets on the Enron Email corpus and report experimental results including filtering, prediction, and recommendation capabilities. We show that the personal behavior and intention are somewhat predictable based on these models. For instance, "to whom a person is going to send a specific email" can be predicted by one's personal social network and content analysis. Experimental results show the prediction accuracy of the proposed adaptive algorithm is 58% better than the social network-based predictions, and is 75% better than pure content-analysis predictions. Studies on other data set also showed significant advantages of applying content analysis for modeling social networks and human behaviors.

S3: Political Networks

Before and After the Exchange of Ruling Elites: Informal Political Networks in Germany's Parliament

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In a parliamentary democracy, good governance depends not just on the good will of the ruling elites. Government performance is rather assessed by number and quality of the bills that get accepted by the legislature. This requires an ongoing process of compromise and consent within and between party caucuses. Social Network Analysis detects social infrastructures which may enable the political leadership to mobilize additional support from particular groups or individual MPs for special missions from time to time. Basis are the affiliations of the German MPs with clubs, corporations, foundations, public institutions, and trade unions. For the 601 members of the last parliament, 3014 such datasets have been retrieved from the public domain. In addition, we now add to the database the informal networks of the new parliament that was elected in September 2005.

For Gerhard Schröder's Social Democrat & Green Coalition that ruled for seven years with a margin of just a few seats, the informal networks were crucial to keep the system going. It was imbalanced only after the opposition had managed to gain control of two thirds of State votes in the Upper House. This was the critical threshold for national legislation that triggered general elections, resulting in a major realignment of the political forces. A Grand Coalition of Christian and Social Democrats was formed under the leadership of Angela Merkel, dramatically reducing the effects of party conflict. The opposition was left with just about 30% of the seats. Moreover, it is split into three distinctly different parties of similar size.

By cluster analysis on shared committee memberships, relevant policy domains have been uncovered. Within these particular domains, we have detected the MPs with high influence or domination potential, using density, centrality, and brokerage measures. MPs have also been identified according to the degree by which they manage to cross caucus boundaries. Analysis is in process for the new and old parliament alike. The social infrastructures of both parliaments may turn out to be resistant to change. But due to the new power distribution on the top, behavior patterns of the rank and file MPs may change. They may no longer feel personally wooed by their leadership to bring about or prevent particular policy outcomes in order to protect (or hamper) the governing elite. When no longer needed, some may develop a new orientation towards investing their individual social capital. Perhaps they engage in bipartisan exercises to logroll for the interests of their clienteles, regions, or political hobbies. Maybe their independent skills in arbitrating, bargaining, finding shortcuts, will further liberate, perhaps even "Americanize" the behavior of ordinary deputies, so that the high value which the German political system places on "caucus discipline" may eventually become diluted.

Governing the Policy Web

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The Canadian policy Web space is a technologically-embedded networked environment in which human relations and decision-making processes determine the flow of information. As information cascades freely across the Web the opportunities to manage, ignore or manipulate that information are significant. The Canadian policy Web space provides public administrators with previously unavailable procedural governance approaches to policy instrument selection. More specifically, Web governance, which represents a significant element of e-governance, is a managerial procedure that may be employed to govern the flow of information.

This project examines Web-based informational governance, using link-structure analysis which considers the

exchange of information in an environment analogous to references and citations. The connectivity of each node (or website) determines both its classification and relationship to other nodes. Using the linked structure of the Web, informational flows and administrative objectives are recorded by cataloguing the various actors participating in the national policy Web, tracing the flows of informational traffic and identifying the relations among actors using resource lists of information documents that direct on-line communication and information.

The Hungarian Transportation Network: Using Network Analysis to Quantify Accountability and Transparency on the M6 Highways

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Network analysis, as a methodological tool, remains filled with untapped potential to offer quantitative evidence for controversial questions in governance. For example, in recent years, some debate has arisen over issues of accountability and transparency in public-private partnerships. Some authors have speculated that partnerships offer poor accountability and transparency because of closed networks, confidentiality agreements, and the confusing array of actors involved in a project. Others counter that partnerships offer greater accountability and transparency through unambiguous output-oriented guidelines and a clear division of responsibilities. Much of the data in this debate centres on interviews and normative judgements of various contracts and documents. Network analysis is a valuable tool to move the debate beyond this conjecture.

This paper, then, will demonstrate how a network analysis can be used to quantify accountability and transparency. Accountability, for instance, can be viewed as just another piece of information—a resource, of sorts—that flows from organization to organization. A network analysis can use centrality measures to determine whether accountability is diffused through the network or concentrated in a few actors. One can also use the concept of paths to determine whether the “line of accountability” is broken within governance structures such as public-private partnerships. Similarly, elements of transparency can also be captured to demonstrate whether information flows between specific partners of the network or is widely diffused.

Upon completing the theoretical arguments for using a network analysis to measure accountability and transparency, the paper will present preliminary results from a Hungarian public-private partnership—the M6 highway project running from Budapest to Dunaújváros.

The Plame Game

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On July 14, 2003 Robert Novak published an article revealing the identity of a CIA operative, Valerie Plame. The release of this information led to Federal investigations, in which numerous people have been publicly implicated and numerous ‘conspiracy theories’ have been posited. However, few theories have been postulated or proven based on scientific rigor; most theories have been created to preserve or protect political ideologies or personal agendas.

These theories can be unnecessarily damaging to political careers and the American Public. Therefore, it is important that these theories be grounded in unbiased, scientific research findings. This paper attempts to provide an unbiased analysis of the people, organizations and events of the Plame Leak Case. Using judgment and snowball sampling, data was collected from public sources on actors’ institutional affiliations, organizational affiliations, actor communications and meeting participation. Affiliation networks were then created based on shared membership in organizations, institutional affiliations, meetings, or other documented communication between actors. Social network methods were then used to 1) identify subgroups that might be groups of conspirators 2) identify key players in the network 3) identify other possible leakers and 4) evaluate the strength of weak ties in this network.

It is likely no surprise that the constructed network is very dense. Most players are connected by more than one type of affiliation. In addition, our findings suggest that the strength of weak ties in this network is great, because these ties prevent any single actor from having too much power over the other actors in their immediate neighborhoods.

Ideology Vs. Party: Multidimensional Models of Political Support in the US Senate

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It is no surprise that in many legislative bodies, including the US Senate, ideology and party membership are correlated dimensions of differentiation. It is also no surprise that political support relations tend to be homophilous with respect to ideology and to party. However, homophily observed on one of these dimensions could be “spurious,” that is, due to a “true” tendency to inbreed on the other dimension and the correlation of the dimensions. I propose models for multidimensional cross-classified tie data to investigate such questions. The models extend previous work for such data developed from biased net theory (Skvoretz 1991) and in-

spired by Blau's (1977) theory of social structure and intergroup relations. They are illustrated with data on ties of cosponsorship in the US Senate from 1973 to 1990. During some years, the tendency to inbreed on the basis of ideology is stronger than the tendency to inbreed on the basis of party. In other years, it is the reverse. In many cases, however, the difference in tendencies to inbreed is not statistically significant.

S3: Centrality Measures in Social Networks

Two New Local Measures of Relative Degree

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Network analysis traditionally draws a sharp demarcation between "whole network" and "egocentric" approaches, using different techniques to examine them. This is partly a matter of convenience in data collection and partly a matter of network philosophy. A core premise of the social network paradigm is that important attributes of actors are derived from the structure of relationships. While egocentric measures are robust and simply calculated, they capture very little of the relational notions at the core of the network paradigm. We suggest that looking at network measures on ego's immediate neighbors can combine some of the strengths of whole-network modeling while being more appropriate to many datasets. Measures derived from local networks are likely to be more robust to noise in global network, are less computationally expensive, and require less data collection. In this paper, we develop two new local relative measures: degree parity and neighbor's degree ratio. The first compares ego's degree to that of ego's degree-1 alters. The second compares the number of highly connected alters to poorly connected alters in ego's degree-1 neighborhood. We discuss these measures, motivation for their development, and their application. We then perform sensitivity analyses by recalculating a range of network measures while randomly deleting nodes using the ever-popular Florentine marriage network and online discussion networks. Our results suggest that local relative measures can provide a middle ground—combining relational notions core to the network paradigm with some easier calculation and data collection of ego networks. Local methods also are more robust than some global measures when global networks are large. For example, average standardized ranges for degree parity, neighbor's degree ratio, and Bonacich's eigenvector centrality are 5.24, 4.99, and 7.30, respectively.

Comparative effects of different centrality measures in dynamic networks

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A number of different measures of centrality have been employed in the study of social networks. These metrics have primarily been employed for the purposes of analyzing 'emerged' (existing) networks. In this paper we examine the influence of individual social behavior on the stability of the centrality of a network as it emerges. To do this, we simulated a dynamic directed graph over time, forcing individuals to change their affiliations (outgoing edges) in each computational iteration, with the 'goal' of increasing their own individual node centrality. Individuals were assumed to have knowledge of the centrality measures of their current neighbors, but no other information, and were thus forced to form affiliations at random with others of unknown centrality. We examine the influence of these decision processes on the over-all stability of the network's centrality under three different centrality measures: degree centrality, closeness centrality and betweenness centrality. We demonstrate that the behavior of the network's total centrality, over time, depended on the underlying centrality measure employed. Based on these differences in stability within behaviorally homogeneous networks, we then investigate the stability of heterogeneous networks, where all centrality measures are represented, but individuals employ only one on which to base their affiliation choices. We examine stability of these heterogeneous networks, under different starting conditions (e.g. proportion of individuals using degree vs. closeness centrality), to evaluate the effect of behavioral heterogeneity on long term total network stability. We hypothesize that one particular centrality measure should emerge as the most successful strategy for individuals, but that which measure achieves that success will depend on the starting conditions of the network. Very few studies have focused on the comparative effects of different centrality measures in dynamic networks. We believe that this type of comparison is not only interesting by itself, but lays the ground work for questions of how centrality-related behavioral choice, can influence the evolution of social network. We feel this is an exciting and interesting new area that deserves attention.

Political capital vs. Centrality in the Mexican network of power

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One usually hears that some people have political capital which is a fussy concept because in some cases it means the number of votes that person or even his party received in a previous election, or it can be the number of followers or the political or administrative position the person has, such as head of a political faction in congress, member of a governmental cabinet. In this paper we will try to assign a numeric value to the political capital according to the number of connections in the network and then we will contrast this value to a centrality value. We will conclude with the analysis of specific actors in the network to assess if the comparison is relevant.

Entropy as a Measure of Centrality in Networks Characterized by Path-Transfer Flow

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Recently, Borgatti (2005) proposed a taxonomy of centrality measures based on the way that traffic flows through the network—whether over path, geodesic, trail, or walk, and whether by means of transfer, serial duplication, or parallel duplication. Most of the extant centrality measures assume that traffic propagates via parallel duplication or, alternatively, that it travels over geodesics. Few of the other flow possibilities have centrality measures associated with them. This paper proposes an entropy-based measure of centrality appropriate for traffic that propagates by transfer and flows along paths. The flow process is as follows: Traffic starts at the node whose centrality we are interested in, and we allow it to flow along paths, one node at a time. At each step, the current node decides whether to stop the flow or to continue it by making a transfer to an adjacent node not appearing earlier in the path. All choices are made probabilistically. The flow stops when a node elects to stop it or when a node has no neighbors available to accept a transfer. With the flow process just described, one can calculate the probabilities that, once a flow has begun, it stops at any particular node. The entropy of the resulting probabilities gives a measure of centrality for the node originating the flow. This paper develops the mathematics for applying the entropy measure to any network. Examples are given, and the measure is compared to other centrality measures.

*S3: Innovations**Specialization and brokerage: Technological knowledge growth as a network of patented ideas, 1975-1999*

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The production of technological knowledge can be seen as a network of ideas, which in turn are cross-fertilizations of previous ideas. Two strands of literature, on knowledge brokerage and on knowledge specialization, argue that new ideas can be fruitfully hybridized, respectively, from unrelated or from closely related sources. We model this diversity of knowledge sources, or lack thereof, as end points spanning a continuum, which enables us to provide an explanation of the differences of knowledge productivity across all technology domains in the USA, over a quarter of a century.

Communication Structure and Productivity of Open Source Software Projects

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This research explores communication structure and relate them with productivity of open source software projects (OSSPs). In OSSPs developers and users communicate in the form of bug report, feature request, support request, and general discussion. Communication structure at each network is quantified with social network indexes. Productivity of OSSPs: development speed is explained by social network indexes.

Social Capital and Innovation at Work

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The importance of innovation at work in the labor market of hi-tech sector in Taiwan has been increasing. Management scientists have found the association between social capital and innovation in organizational studies; however, sociologists seem to ignore the facts. This study attempts to explore the effects of three dimensional social capitals (variety, trust, and structural holes) on the innovative ideas and acts at work. This paper analyzed 2405 cases of currently employed respondents in the national survey on Social Capital in

Taiwan, held from November to December, 2003. The diversity of position-generated networks of individuals increases the frequency of innovative ideas and acts at work. The more position-generated contacts that respondents trust increase the frequency of innovative ideas and acts at work; however, the effects of network density among position-generated contacts (or structural holes) do not have significant effects on the frequency of innovative ideas and acts at work. The social environments at workplace also affect the frequency of innovative ideas and acts at work, and these effects are stronger in hi-tech sector than those in non hi-tech sector.

The Structures of Conceptual Change

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We incorporate optical color tests and linguistic methodologies into a network analysis of a group of Tzotzil-speaking Mayan weavers in the remote highlands of Chiapas. As new colors of threads, such as grey, beige and taupe, were adopted by these women -- who traditionally used only vibrant colors -- we traced patterns of conceptual change in relation to their existing knowledge and communication in the network. We see strikingly systematic patterns that reveal some of the underlying cognitive mechanisms that constrain adoption and change. We use network analysis and visualization of k-cores to demonstrate the adoption of new colours and trace the structure of conceptual change from the level of the individual to the level of the group.

The Integrative Study of co-inventor and co-author networks: an Application of Social Network Analysis into Innovation

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Yasunori Baba

Commercializing science involves knowledge transfer from university scientists to corporate researchers and university-industry collaboration allows capture of tacit knowledge by firms, leading to possible market formation. An indicator of a firm's knowledge capture in the biotechnology industry is found to be the number of research articles written jointly by firm scientists and discovering star scientists and identifiable collaborations between university star scientists and firms have a positive impact on firms' research productivity. However,

observing the collaboration in advanced materials, we find the "two way" interaction in knowledge creation and then the impact of "core" corporate researchers on firm' R&D productivity. In our definition, the "core" researchers have experience of jointly apply patents with university scientists and of jointly write research articles with university scientists. In the context above, we managed the study of two types of social networks i.e. co-inventor networks and co-author networks in an integrative manner. For that purpose, we used a nucleus of corporation or university, rather than an individual inventor as an appropriate unit of analysis by developing the institutional affiliation database of each inventor or author. Structural and evolutionary network patterns are compared so as to identify distinctive nature of each network and panel analysis is conducted to measure the impact of "core" researchers on firms' R&D productivity. Three-dimensional visualization of time-slice and evolving pattern of those networks are used to point out salient structural features. Panel regression analysis of various network indices is utilized in an application of social network analysis into firms' innovation performance.

S3: Social Support

The Burden of Social Network and Depressive Symptoms

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The objective of this paper is to study how the mental health of people at different age and educational levels is affected by their relationships with friends and relatives. Data were collected through face-to-face interviews with a structured questionnaire from a stratified random sample (n= 1121) of Chinese adult residents in Hong Kong in 2000. Mental health is indicated by a Chinese version of the Center for Epidemiological Studies Depression (CES-D) 22 item scale, which is a measure of depressive symptomatology. It was unexpectedly found that younger adults, better-educated people, and people with larger social networks were more likely to suffer from depressive symptoms. Further analyses based on multiple regression and path models reveal that the burden of social network, i.e., the feeling of being bothered or burdened by the demands of friends and relatives, plays an important mediating role in the various paths to depression. The younger or better-educated people and also people with a larger social network felt more burdened by their friends and relatives and were thus more likely to express depressive symptoms. These findings are held among both men and women in the sample.

Local Currency and Social Support Networks

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Local Currency systems have recently drawn attention with its economic, social or cultural effectiveness and employed in communities all over the world. In this paper, we introduce the concept of social support as one of such social effects, which has never been studied in previous research. Local Currency transactions yield lots of reciprocal exchanges and human relationships among members, hence we can assume that they provide a large amount of social support. To study social support provided in a community, Wellman (1983) says that Social Network Analysis is suitable since the traditional dyadic approach cannot take the viewpoint of social support as social capital into consideration. As we can fix the boundary between the registered members of Local Currency organization and the others, we use Whole Network Analysis instead of Ego-network approach to grasp the structural and dynamic network characteristics which are more likely to generate social support. Social support scales (e.g. Sarason's SSQ) are incorporated with network measures to assess quality and quantity of social support which will not be assessed by network measures alone. Using social support scores and transactional records of Local Currency users in Muraoka-town Japan, we examine the relationship between the network characteristics and social support scores of members and find that; 1) quality and quantity of social support are affected to some degree by whole network characteristics so that dyadic or Ego-network approach are insufficient for Local Currency transaction. 2) Autonomous distributed characteristic of Local Currency network is effective in providing social support.

Informational Resources for Cancer Survivors: Which Institutions Count?

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In 2005, cancer is still a daunting health problem, and due to the complex nature of health care provision in this country, many patients routinely seek out information to augment their physicians' assessments. From the patient's perspective, organizations that provide information resources are a large and often undifferentiated block, and evaluating which of these sources provide the best information can be difficult. However, problems delimiting the cancer survivor population have led to a paucity of research on how patients behave in seeking useful medical information, and how they might decide "who matters". As an analytic alternative to the patient perspective, I turn towards hospitals as a reliable source of legitimate authority in the medical field as they repre-

sent key nexuses of information and skills. I enumerate a list of elite cancer hospitals and argue that from the signals these hospitals broadcast we might learn which resource-provision organizations are most significant. I deduce this by noting elite hospitals' trusted referrals to support organizations on hospital websites and construct an affiliation network based upon these ties. I first discuss prestige measures of the network of support organizations; then compare these data with results from search strings for cancer in Google (a proxy for patient-sought information); I finally note which elite cancer hospitals offer the most efficient information route between information-seeking patient and support organization, based upon the structure of the network. My conclusions highlight a potentially key role that support organizations occupy in mediating hospital quality and health outcomes.

Struggling but not alone: Social networks of children heads of households in Namibia

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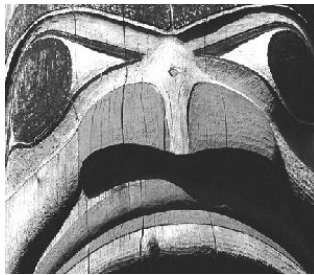
This study examines ways in which families and communities can better support child-headed households (CHHs) in Namibia, building upon the strengths, personal social networks, and human dignity of children. Due to poverty and the spread of the AIDS pandemic, families are under increasing stress, CHHs are becoming more common in many countries, and the number of relatives available to any given individual is decreasing rapidly. The first analysis of this phenomenon in Namibia, this study engaged with children heads of household in mapping their social networks—both supportive and non-supportive, assessed children's needs and strengths, and analyzed the institutional and contextual factors that affect children's options for coping in a country heavily affected by HIV/AIDS. Both qualitative and quantitative methods were used; this paper will mainly describe the social networks of children in the context of children's needs and satisfaction with the assistance received from alters. The ultimate purpose of this study was to identify ways to enhance family functioning and children's development through creating and strengthening supportive social networks among extended families, friends, and communities. This study helped create higher awareness in children and communities of their own resources, thereby increasing their potential for network building and maintenance as well as for taking action to improve their own lives and the lives of others.

A Study of the Social Support Networks of Cancer Patients

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This paper uses social network analysis to examine the sources and nature of support sought by adult patients while in treatment or post-treatment care for cancer. As part of a larger survey investigating the coping behaviors of patients in high risk, high-stress medical situations, attribute and relational data were collected from 33 head and neck cancer patients in the northeast United States. Analysis examines relationships between key individual variables (e.g., demographics, desire for control, self-efficacy, etc.), context specific variables (e.g., disease category, stage and level of complexity), the sources of information and social support, and the influence of these

variables on patients' perceived overall health and quality-of-life. We identify what types of support, from what sources are most sought after by the affected population, and what information they would like to have had but which was not available. Results indicate that patients rely on an average of six people, representing four types of relationships, most frequently spouses, relatives, friends and doctors. Individuals with a relatively more even split of strong ties and weak ties in their social networks report higher levels of perceived overall health, overall quality-of life, and satisfaction with how they've coped than do those with a less even split of strong and weak ties.. Those with higher feelings of self-efficacy have more efficient social support networks, and are significantly more satisfied with how they've coped and with their perceived quality-of-life, than are those with lower self-efficacy.



S4: Mathematical Models

Why are networks the shape they are? Part 2 The Simulation.

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 Carroll Graduate School of Management
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At sunbelt XXV we presented some ideas that tried to explain why so many networks have a general core-periphery structure. The hypothesis proposed was that many networks consist of loosely connected core-periphery structures which we call general core periphery structures. The explanation for this was that such networks are efficient and adaptable and are able to survive a variety of attacks. In other words they are highly sustainable. The talk also suggested a mechanism for the formation of such networks. Namely preferential attachment and homophily moderated by physical and

Saturday Afternoon Part Two

social constraints. In this talk we discuss and refine a simulation of this mechanism which helps understand and describe certain features of general core periphery models.

A Nonlinear Model of Political Decision Making in Small Groups

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We model small group political decision making as opinion change in a social influence network in which group member positions or opinions with respect to a given policy issue evolve in response to the influence of other group members, external events, and incoming information. The form of the model is guided by social psychology theories on attitude change and cognitively-based approaches to foreign policy decision making. The model represents decision maker policy positions as arrayed along a one-dimensional spectrum over which their positions are dynamically evolved via a set of coupled nonlinear differential equations. The model displays a range of interesting and intuitively reasonable behaviors that are inaccessible to linear models of opinion change dynamics such as sharp transitions between consensus

and deadlock states, path dependence, and decision instability. We show how the nonlinearity interacts with the network structure to impact the efficacy of the group leader to bring about and preserve consensus between ideologically distinct factions. The results of the model suggest new empirically testable propositions of a qualitative nature that do not require quantitative implementation of the model. We discuss the broader implications of our results for theories of social influence networks, centrality, and social cohesion.

*Evaluating Social Influence Relations: an
Item-Response-Modeling Approach*

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Network Autocorrelation Models [Anselin 1988, Doreian 1989, French 1956, Friedkin 1986, 1998, Leenders 2002] are employed to analyze and predict attribute dynamics in social networks. Representing an integrative view on social influence, they rely on determination of the relative strength of the network's influence relations. There are a number of approaches dealing with operationalization of those influence weights [French/Raven 1959, Friedkin 1998, Leenders 2002], prominently deriving them from the influence network's structure. In contrast, this paper presents a direct approach to measurement of social influence relations. A modification of Turner's [Turner 2005] three-process theory of power has been employed to construct a questionnaire which focuses on the aspects of persuasion, authority and coercion. By using Item-Response-Theory methods in form of Rating-Scale- resp. Partial-Credit-Models [compare van der Linden/Hambleton 1997], the instrument offers interval-level measurement of social influence relations. As a feature of the method, these measures are 'objective' in the way that they can be explicitly related to behavioral propensities. The paper will briefly examine purpose and theoretical background of the project, as well as models and resulting item sets.

*Actor-driven alternatives to exponential random graph
models*

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Today, the most prominent tool for the analysis of complete networks is the family of exponential random graph (ERG, aka p^*) models. While mathematically elegant because equipped with a transparent probability distribution function, these models are notoriously difficult to estimate and/or estimates, once obtained, are difficult to interpret. In this paper, alternatives to ERG models are proposed which are derived from actor-driven models

for longitudinal network data. These models have a much less transparent probability distribution, but can be specified such that they are easier to estimate and interpret. In a comparison of model specifications on a sample data set, issues of model degeneracy and parameter interpretation are illustrated.

S4: Statistical Methods

Cascade Dynamics of Complex Propagation

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Random links between otherwise distant nodes can greatly facilitate the propagation of disease or information, provided contagion can be transmitted by a single active node. However we show that when the propagation requires simultaneous exposure to multiple sources of activation, called complex propagation, the effect of random links is just the opposite: it makes the propagation more difficult to achieve. We calculate numerically critical points for a threshold model in several classes of complex networks, including an empirical social network. We also provide an estimation of the critical values in terms of vulnerable nodes.

*Tight and loose clustering: measuring structural tendency
toward triangles or diamonds*

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The concept of network clustering is typically measured via network statistics that capture the extent of triadic closure in a graph. Yet there are theoretical reasons to expect local clustering even in contexts where triadic clustering is rare or forbidden. One such type of "loose" local clustering is captured by open diamonds, the minimal closed structure in bi-partite graphs. Further, there are some contexts in which we might observe both tight (triadic) and looser forms of local clustering. In this paper we discuss these issues and introduce a simple way to mathematically represent the structural tendency toward triadic or looser clustering in graphs. Unlike many other measures of clustering, this representation incorporates information about graph size and density, and allows for meaningful comparison of graphs with varying characteristics.

p2 model fit and diagnostics

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University of Groningen, University of
 Dept. of Sociology, Washington,
 Groningen, the Dept. of Statistics,
 Netherlands Seattle, WA, USA

Bonne Zijlstra

University of Amsterdam,
 Dept. of Education
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Model evaluation and comparison is difficult in social network analysis due to the non-standard statistical models. For many of the social network models currently applied in social network analysis, including the p2 model, it is unclear how to select a 'best' model or to assess its goodness of fit. The Bayesian methodology for model checking using the posterior predictive distribution of goodness of fit statistics or diagnostics may provide a solution to this problem. It is generally applicable and relatively easy in combination with the current MCMC estimation methods. An important characteristic of the p2 model is that it relies on nodal and dyadic attributes to model dyadic outcome probabilities and allows for actor sender and receiver heterogeneity using random effects. A number of fit statistics and diagnostics are proposed for the p2 model, related to prediction accuracy and structural network properties.

Multiple networks: Comparing QAP and exponential random graph (p^) models*

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We study the associations between networks of advice, information, work-difficulty, and trust in a government instrumentality, using QAP correlation (Krackhardt, 1987) and exponential random graph (ERG) models for multiple networks (Pattison & Wasserman, 1997). We fit multiple network ERG models incorporating the new specifications of Snijders, Pattison, Robins and Handcock (2005) within networks, and dyadic association parameters between networks. We estimate parameters using the Monte Carlo Markov Chain Maximum Likelihood technique described by Snijders (2002). In our data, a QAP analysis indicated a significant positive association between advice and information networks. As expected, an ERG model also produced significant dyadic association parameters. Goodness of fit analysis showed that this model was also successful in explaining the across network triangulation effects. QAP analysis also indicated a small negative non-significant association between work-difficulty and trust networks. However, an ERG model with independence across networks was inadequate in explaining cross-network triangulation effects (balance-like effects). Inclusion of dyadic association effects produced a significant negative estimate for

arc association and a significant positive effect for reciprocity. Balance effects were better explained, but not completely, by this model. We conclude that when a number of countervailing effects apply, including possible triangulation effects, a non-significant QAP may mask substantial structural associations between networks.

*S4: Network Dynamics B**Global dynamic effects of manipulation and annihilation of well-connected hubs*

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 Ottawa, Ontario, Canada

Zachary Jacobson
 Health Canada Ottawa,
 Ontario, Canada

Hubs ["superspreaders" in epidemiological terms] are nodes with an anomalously large number of links. They are present in very complex systems, ranging from the Internet to economy to biology to epidemiology. They occur in many or most naturally occurring physical, biological and social networks, particularly those that are scale-free. In this paper we investigate the role of such hubs in network dynamics. Using simulations, we test the intuitive hypothesis that silencing a hub has a higher impact in network dynamics than silencing a less-connected node.

Our model consists of a network of nonlinear oscillators. Initially we set control parameters and the couplings among oscillators so as to produce chaos in the global behavior of the network. We then manipulate the chaotic behavior of the global network by modifying the local behavior of chosen nodes; the effect is measured in terms of the level and form of chaos of the network's summed activity. In general, chaotic network activity is first reduced to a periodic fluctuation and finally to a fixed or steady state. We investigate the parameters of this modification as a function of the connectedness of the node manipulated [i.e., is it a hub? how well connected? How centrally located is it?].

The Third Entity in the Dyad: the relationship. Exploration of reciprocal and non-reciprocal relationships

Diana Jones

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JL Moreno (1889 – 1974) valued the display of disturbances in relationships in order to free up the 'actors' to participate more fully in life. His explorations of the relationships between people and within groups led to his identifying and measuring the emotional flow of feeling between people. He called this tele. Tele either draws us toward people (attraction) or has us move

away (rejection) or be neutral (not have a sense of). These are not linear measures. It is the enactments of these flows of feeling which create, maintain, damage and evolve social networks. In mapping and exploring social networks, we are mapping the telic relationships. Non-reciprocal relationships can be explored and mapped. This paper outlines the nature of tele, and indicates implications for network researchers, particularly where there is resistance to network explorations. Examples from a recent study of an established high functioning 16 person leadership team using UCINET, graphplot and INFLOW are used to identify what is evident in non-reciprocal relationships and the affect and outcomes in working productively with this material. Implications for identifying research information and participant information are identified.

Positional Analysis of Process Data:

The Moving Structure Approach

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Alexander Rausch

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Studies on social networks are often based on data which are collected at a definite time or at a few points in time or they are accumulated over an observational period. The analysis of network dynamics is difficult if not impossible in these cases. There are many relational process data available in the internet, which only have to be analysed, e.g. data drawn from mailing list archives, but there are only a few approaches how to handle these data and how to analyse them.

Network dynamics was first considered context of the formation of social relations (classical example: newcomb fraternity data, Harrison White et al. 1976 and Arabia et al. 1978). The idea was that once social relations were established they would persist over a long time. Several years later, the focus shifted from the emergence to the crash of networks (for instance Emirbayer & Goodwin 1994). Since then network scientists have paid increasing attention to the dynamics of networks.

We deal with discontinuous process data drawn from the mailing list archives. Our approach is to accumulate contacts between the mailing list participants in a small time window moving over the observation period (a "sliding window"). The window covers a time range of three months and is moved in one-month steps over the complete observation period of 30 – 38 months. For each step the network of ties between the mailing list participants is built. A tie between two mailing list participants is said to be present if they share at least one thread. The strength of tie is defined as the number of shared threads. We thus obtain a sequence of networks, each referring to a time interval of three months. For each network a positional analysis is performed. We chose

two different ways to illustrate the development of the network over time: First we used a transition matrix, in which the positions for each participant in each temporally restricted network are recorded. Second, we build a time-event-network and illustrate the evolution of the network as a sequence of graphs. We present a new method of positional analysis which takes the dynamics of the evolution of social networks into account. We analyse the occupancy of network positions over time and focus on the exchange of actors between these positions and show that network positions are stable, even if the actors occupying this positions may change.

Network Evolution, Regional Embeddedness, and Investment Performance in the Venture Investment Arena

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The main research question I address in this paper is, "How does embeddedness in different types of network subgroups affect actors' performance over time?" I map the social network structure (with attention to different conceptions of network subgroups) in each period and use time-series analysis to assess how embeddedness in these different subgroups affects actors' performance outcomes over time. I pit various conceptions of "region" (proximity) against a conception of "cliques" (k-components) to understand some of the strengths and weaknesses of each. For the purposes of this project, I use two decades of data on venture investors and their co-investment networks.

S4: Intra-Organizational Networks C

The Link between Interaction and Learning

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Cross and Cummings (2004) anticipate that certain ties might yield better or more relevant information than others, based on the fact they might provide experience, novel information, and legitimation. This prospect raises interest in the effect of multiplex embeddedness on collective knowledge creation and sensemaking. In order to determine how various interactional types influence learning, I will examine the relationship between these elements in a structural model. Work interaction, which is predominantly analysed in studies of social networks, is divided into three interaction types: goals & strategy, work experience, and routine work interaction. Some conversations that take place at work are not of a work-related character; therefore, these non-work related interactions are included in the study. The chosen

empirical setting is that of four districts of pharmacies, each identical in operational contingencies. Using survey data collected from all employees (n= 258) in these four organizational sub-units, a structural component of interaction has been extracted per interaction type, and used as input in a structural equation model along with a framework that is meant to capture aspects of collective learning. These variables include: learning on the collective and individual levels, information sources, autonomy, innovative goal formulation and knowledge creation.

Team network performance

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The study is based on the questionnaire related to work teams (n=595) in public and private sector organisations in Finland. The data consists of total networks of teams (n=98) (communication, advice, and emotional support) as well as performance measures of the team as evaluated by the managers of the organisations. Team research has paid scant attention to the relational structure of teams. Moreover, the organizational context in which teams operate has been overshadowed by the analysis of mental states of team members. Consequently, the first aim of the study is to elaborate whether the performance is related to network structure of the teams. The second aim of the study is to examine whether organizational context shapes the social structure of the teams.

*Department Networks and Teacher Development:
Implications for Leadership Roles in Schools*

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Dept. Educacao,
Ponta Delgada, Portugal

Many schools are organized into departments, which function often as contexts that frame teachers' professional experiences in important ways. They serve as critical points of reference for teacher identity, interaction, and professional development. Teacher development can be promoted or inhibited by the particular structures taken by relations among colleagues within these departments. Of particular interest in this respect is the role of the department head. Is the head a central actor within his or her department, with respect to the promotion of teacher development, and actual collaborative work practices among colleagues? Does he or she have a key impact on teachers' perceived levels of professional development? These are some of the central issues discussed in this presentation. The paper reports a study of departments in two schools. Data collected on networks in the schools were of two types: structural (joint professional practice), and cognitive (perceived impact on professional development). Measures include network

cohesion and actor centrality. Results are discussed in terms of their implications for teacher development and leadership practices in schools.

S4: Qualitative Approaches B

*When Ties are non-Ties and Non-Ties are Ties: Allowing
Emergent Definitions in Network Data Collection
Instruments*

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While numerous scholars insist that Social Networks is more paradigm than method, not all current research fully incorporates what this implies. One such shortcoming is in data collection instruments, which sometimes rely more on essentialist quantitative survey techniques than on the theoretical underpinnings of the relational models suggested by network theorists. In this paper I show how tracing ideas from linguistic structural theory (e.g., Derrida, Lyotard and Saussure) through symbolic-interactionist constructions (e.g., Goffman and Garfinkel) can produce an emergent idea of "node" and "tie," which can be helpful in gathering some types of network data. The model is applied in a study of the response of rural religious organizational leadership to the present AIDS epidemic in Malawi. I show, how using these methods allowed the collection of data that represented the contexts within which organizational response has developed more readily than more formalized approaches would have allowed.

*Misrecognition or Misapplication: Are Social Networks
Always Social Capital?*

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Network-based theories of social capital such as Nan Lin's, are based on the application of rational choice theory to social interaction, which looks at the instrumental use of networks and not the actor's intent. In Bourdieu's theory, he argues that actors sometimes "misrecognize" social capital rather than seeing the economic bases of social exchange. This paper argues that attention must be paid instead to the meaning attributed by actors to understand whether and when social networks operate as social capital. This paper draws on preliminary findings from open-ended interviews, which were conducted as part of a larger research project, with elementary school teachers about their working relations with other teachers. This paper demonstrates that while teachers sometimes recognize that their colleagues can be useful, other times they rely on other teachers for goal attainment without acknowledg-

ing the utilitarian usefulness of network members. This paper proposes a more subjective, actor-oriented definition rather than an observer's view of social capital, arguing that the definition of social capital should be narrowed to only those ties which actors recognize themselves as useful rather than all ties which they in fact use.

TELEWORK: Can technology support social relations?

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Adm, Strategy and Management,
Norway

Janet Salaff

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Dimitrina Dimitrova

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To study work processes and communications, we start by analyzing where workers get the resources they need to accomplish their tasks. We look at three sources: the formal organization, the workers' human and social capital. Some work is done in short cycles with time pressure, other work is projects with longer time frames. Bureaucracies design work-flows to follow a linear sequence. Project work takes place in teams with mutual interdependencies, the organization is a network type. We did our first study in 1995-97 of a large company that pioneered telework interviewing people in office settings and later as teleworkers. We found that people working on long term projects, found teleworking eased the work process. They depended on a network that spanned internal and external contacts. People working in tightly coupled bureaucratic settings found telework difficult. They needed quick access to their colleagues for solving problems and much paper work interrupted the work flows. Our follow-up study in 2005 showed that advances in information and communications technologies had improved the situation of workers in tightly coupled work situations, although they need time to get familiar with their community of practice. They are now able to do their work on-line. Internet technologies, as chat-lines, make it possible to see who is available for problem solving.

A Question of Access or Mobilization?

*Understanding Inefficacious Job Referral Networks
among the Black Poor*

Sandra Smith

University of California, Berkeley

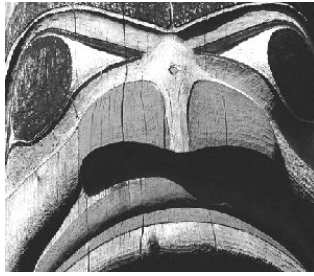
Currently, there are two approaches to understanding the relative inefficacy of the black poor's job referral networks. The first approach represents conventional wisdom and explains inefficacy in terms of the black poor's lack of access to mainstream ties, especially

among residents of high poverty neighborhoods. The second is an emerging perspective that explains inefficacy in terms of the willingness of potential job contacts to be mobilized for job-finding assistance. This article is an attempt to bridge both approaches. Drawing from in-depth interviews and survey data of 105 low-income black men and women, I examine systematically the relationship between the black poor's access to social capital, orientation toward providing job-finding assistance, and neighborhood poverty status. I find that access to social capital, measured using position generator variables, is significantly lower among residents of high poverty neighborhoods, but only among the unemployed. Employed residents of high poverty neighborhoods look little different, in terms of access, than their counterparts in less poor neighborhoods. When in possession of job information and influence, residents of high poverty neighborhoods were also found to have greater distrust and reluctance toward providing job-finding assistance than those in less impoverished neighborhoods. And the two were related. Distrusting job contacts and those generally reluctant to provide job-finding assistance tended to have less access to social capital, especially with regards to their connection to skilled and semi-professional positions. Implications for the relationship between access and mobilization are discussed.

*Self-Monitoring and Social Network Centrality: A
Longitudinal Investigation*

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This study examines the dispositional origins of evolving friendship and advice networks. Our sample consisted of 388 incoming business-school freshmen at a major university who were enrolled in a mandatory nine-month long business course. The students were divided into separate face-to-face groups that worked on a year-long "consulting" project with local companies. Results showed that—even after controlling for the effects of gender, ethnicity, and group membership—differences in self-monitoring personality were systematically related to differences in social network centrality; and these differences persisted even as the social networks evolved over time..



Sunday Morning Part One

Su1: Networks, Economics, and Markets

How social networks influence location decisions of firms

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Network theory and analyses are increasingly being used to specify concepts that used to belong to the economic discipline. Examples of such concepts are: (1) Innovation (Burt, 1992, Granovetter 1983) (2) Markets (Podolny, 2001, White, 2002) and (3) Performance of firms (Uzzi, 1996). However, few examples can be found of social networks applied to spatial economics. In this paper, we will concentrate on the relation between spatial economic clustering and social networks.

A. Existing literature on networks and innovativeness provides fundamental principles about how network characteristics affect innovation and accessing new knowledge and development of new ideas. (2) Uzzi (1985) showed that firms embedded in social networks have a better survival chance. Over-embeddedness however, can also be negative.

A phenomenon that gets increasing attention by economists is the emergence of spatial clusters. An underpinning of locational behavior for firms, based on social networks is, on the other hand still lacking. In standard regional economic literature locational behavior is determined by (1) Transportation costs (2) Urbanization economics and (3) Agglomeration economics. However, external economies of scale are still a black box and additional theories are needed.

Krugman (1991 and 1996) was the first to develop a theoretical model unraveling external economies of scale. In his model, monopolistic competition and transport costs play a central role. Secondly, agent-based models more and more play a role in economic theories introducing interactions between actors (Epstein and Axtell, 1996). Building upon social interactions we will present a framework on how social networks influence external economies of scale, consequently extending standard economic theory of location behavior of firms.

Networks in the New Economy: Labor Market Institutions and the Job Matching Process

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Since Granovetter's frequently-cited work on the role of social networks in the labor market, many have tried to document the relationship between networks and labor market outcomes. However, the results of these studies are quite inconsistent. In this paper I specify two distinct theoretical mechanisms through which networks could affect labor market outcomes, and outline how each interacts with important structural features of networks and other labor market practices. Results from a computational experiment using these mechanisms accounts for many of these formerly "inconsistent" findings. Specifically, results confirm that context, in the sense of global network structure, strength of employment relationship, and employers' preferences, has profound consequences for careers, the distribution of opportunity through the population, and the meaning of "good" and "bad" networks. These theoretical advances are particularly important in light of evidence that there has been a general decline of "career jobs," a trend that puts renewed pressure on the job-matching process and those extra-organizational institutions--such as social networks--that play a role in job-seeking and hiring.

Lobbies Europeanly Institutionalized: European Social Dialog with the Organized Civil Society. The European Economic and Social Committee (EESC).

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The idea that lies in the Social European Dialogue mentioned in the Protocol 14, is that it recognizes the need that European Institutions have to count with the collaboration of the Organized European Civil. This collaboration is necessary to develop satisfactorily the European integration process. It is also necessary because Europe cannot increase any more the costs of supporting the welfare states.

The European Economic and Social Committee (EESC) wants to be a bridge between Europe and organised civil

society. It is one of the advisory organs of the European Union (EU). The different groups of interests from the Organized European Civil Society are represented by the EESC. This Institution manifests itself through reports and advices to which the countries, members of the EU, are not bound. But they are an excellent source of information for the European Commission (EC) and a tool for future discussions on different issues and decisions.

The Decisions of the EC affect all the social and professional sectors of the EU countries. Furthermore, the EESC, due to its advisory disposition, occupies one of the most strategic political positions in the European legislation. The Committee is an Institution that has influential political power. It is the key to the Organized European Civil Society who tries to perform lobbying actions in Europe.

This research tries to understand the potential power and influence of the Committee's members. After looking into the co-membership network I have fragmented it into high, medium and low social capital structures and analyzed the relation of intra networks. It goes so far as to identify who are the persons, countries, sectors and entities that occupy the most privileged positions of influence.

Hearing About A Job: Networks, Information, and Segregation in Labor Markets

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We present a framework for simulating labor market matching processes in order to study mechanisms that generate segregation. Empirical evidence reveals that labor markets are often highly segregated with respect to the ascribed attributes of workers. Many occupations are sex-typed, while in heterogeneous societies certain fields are often dominated by specific ethnic groups. Various explanations have been proposed to account for segregation in labor markets. On balance, most of these explanations can be classified as essentially 'supply-side' arguments, emphasizing differences in human capital distributions between groups, or 'demand-side' accounts, based on employer preferences (either in-group or out-group biases). Yet the process of labor market stratification is not merely a matter of the human capital characteristics of workers or the preferences of employers; it also a function of the complex process by which persons are matched with one another, including the way that agents in the market find and evaluate information. In our research we address these oft-overlooked issues by considering two network-related aspects of the matching process explicitly: who knows about jobs, and how employers evaluate referrals. Using an agent-based simulation model, we show that referral hiring, in the presence of network homophily, results in acute segregation by ascribed

attribute, even in the absence of discriminatory preferences on the part of employers or supply-side human capital differences. Further, both network structure and the way employers evaluate referral applicants versus non-referrals can amplify or mitigate this effect.

Social Network, Cohort Influence and Employability

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In an investigation of the reasons for the economic inactivity of those aged over 50 and below state retirement age data have been collected from a labour market in Scotland. Four groups, those in work and aged under fifty years and those aged over 50 years and out of work counterparts were interviewed with a structured questionnaire. From this the influence of cohort size on employability can be judged with controlling for a person's demographic profile, qualification and skills level and their employment history. When fitting binary logistic models these variables are found to be inadequate in explaining a person's current employment status. The explanatory power of the models improves when social network variables are added, particularly the proportion of their network members who are in work. From examination of the ego centric networks it was found that the social capital which is embedded in the actor's network was a key determinant of their employability. From this recommendations are made that in order to keep older workers in the labour force, which is required as the population ages, policy makers should ensure that deficiencies in an individual's social network are compensated for by providing alternative means of connection to work.

Su1: Networks and Science

Construction and analysis of bibliographic networks

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FMF, Matematika,
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On the Internet we can find different bibliographies (DBPL - <http://dblp.uni-trier.de/xml/>, BibTeX - <http://www.math.utah.edu/~beebe/bibliographies.html>).

From such bibliographies several two- and one-mode networks can be constructed relating different data: authors, countries, keywords, journals, ... considering the date of publication they can be turned into temporal networks. We will describe an approach to analysis of bibliographies. First we construct some basic two-mode networks. We will discuss different problems encoun-

tered in this process. From the basic networks we can afterward using network multiplication compute other networks. To illustrate the approach we will present an analysis of networks derived from the DBPL bibliography. Since some results are dense valued networks we will describe how we can obtain insight into their structure using matrix display.

Perceptions of the Research Environment: Examining the Role of Researchers' Networks

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This paper examines the relationship between the social network positions of scientists and their perceptions of the research environment within their respective research organization. While the performance and productivity benefits of social networks in science have been amply demonstrated (Katz and Allen, 1985; Liebskind et al, 1996; Reagans and Zuckerman, 2001; Mote, 2005), there is still little understanding of how networks might affect scientists' perceptions of their research environment. Because the work environment has also been identified as a key factor for research success (Balachandra and Friar, 1997), it is essential to understand the interaction between social networks and the organizational research environment. In the context of this study, the research environment has been characterized as a set of specific organizational attributes previously identified by researchers as important for conducting high quality and relevant research, including such things as sufficient and stable research funding, internal communication, cross-fertilization of ideas and career advancement, to name only a few (Jordan, 2005). This paper utilizes three related datasets that were gathered with a comprehensive survey instrument administered in Spring 2005 to a research organization consisting primarily of oceanographers and atmospheric scientists. The first is a network dataset of researchers and project affiliations, conceptualizing this type of network as a "project ecology" (Mote, 2005; Grabher, 2002). The second is a dataset that was gathered using a name generator question to solicit internal and external network contacts. The third dataset consists of responses to a comprehensive set of questions that attempt to measure the "health" of the research environment. Analysis of the data is supplemented by interviews and field research. Results are discussed in terms of their implications for managerial practice and future research.

Science for science's sake: Informal scientific networks and their resilience to social engineering

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In February 2004, the Board of Trustees of a large national research center approved the first significant reorganization of the Center in a decade. First implemented in October 2004 with the goal of enhancing the efficiency and effectiveness of the Center's scientific collaboration and integration, the reorganization has restructured the Center from nine divisions into five laboratories. Using literature from organizational studies and methods of network analysis, this paper discusses the findings of a longitudinal analysis of how this institutional transformation is affecting scientific networks within this Center. Although it is still early in the transformation process, it seems that the reorganization's structural and managerial are at least preliminarily having an insignificant if not a negative impact on the scientists' attitudes and activities related to collaboration. We argue this is because, although formal organizational structures shape the political economy of the Center and affect individual and collective activities, scientists tend to think and act on the basis of scientific priority rather than organizational directive. As demonstrated by our network data, the active but informal culture of collaboration that pre-existed the transformation remains underway within this Center, while efforts to "engineer" more formal collaborations have not yet yielded new partnerships. These first-round findings are based on the results of a survey administered in February 2005 to all scientists in the Center as well as the data from one-on-one interviews with a systematic sample of scientists in November 2005. Data collection will be repeated again in 2006 and in 2007.

Co-investigator Networks among and within National Science Foundation Directorates

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Many scientometric studies (e.g., de Solla Price 1965) conducted over the course of the last forty years have used cocitation and coauthorship as standard measures for scientific success, collaboration, and scientific productivity. Studies of such publication patterns within high-energy physics and other "hard science" projects (Kling, 2000) have consistently emphasized the presence of large, collaborative teams and their association with scientific success. Are these linkages between "success" and collaboration justifiable, and to what extent? How are changes in the observable patterns of collaboration related to future success, and how do changes in the

structure of the NSF affect these patterns? In this project, I investigate the properties of co-investigator networks extracted from a collection of grant funding data provided by the National Science Foundation, covering the period from 1985 to 2002. Data about each author is used in order to construct the graph of participation in collaborations funded by the NSF, which is considered in terms of its administrative directorates. Preliminary research reveals several interesting properties of collaborative practice within the examined directorates: a very low incidence of non-dyadic collaboration, a sharply declining number of collaborations as the number of participants increases, and a substantive number of isolated cliques and breaks in the 'backbone' of the network. Within the context of this project, snapshots of the evolution of each directorate serve to present an interpretable map of changes within the network, while careful analysis of the properties of participating actors reveals other patterns of scientific and collaborative activity.

Public, Private, and Secret Faces of Influential Nuclear Networks

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From the initiation of the Cold War scientists built and maintained far-flung networks of professional, personal and state importance. Both national and international, these networks were mobilized to create new scientific institutions and to enhance the careers of the scientists at their center. These men were also high officials of states all of which sought an exclusive nuclear self-reliance, mediated through the most powerful technologies then known – bombs, reactors, and uranium. Actors in these influential networks presented three faces: though distinct in an analytic sense, these faces were not widely separated, because these individuals carried them around everywhere. If nuclear networks were to function these three faces were indispensable.

The first face was the public face of scientists, cultivating their professional reputations, reaching for distinctions like Fellow of the Royal Society, and nominations for the Nobel Prize. The second face was their private face, cultivating and enjoying their friendships and intimacies, furthering and satisfying the interests of their families, friends, or kin. Actors in these networks had often been friends since the 1930s. The third face was their secret face, through which they held and withheld state secrets given to them as members of Atomic Energy Commissions, etc. They would not have access to these secrets without the public scientific face, and they would not have been able to work among these secrets without the second private face, conveying confidence among friends. Indeed, their secret networks would have dried up without a degree of reciprocal exchange, in that some secrets had to be hinted at or traded away in order to get a significant secret back. But in nuclear networks one had

to be capable of understanding the significance of secrets more than simply to possess or transmit them, and that understanding depended on a high scientific reputation, or the professional public face.

These configurations had a mirror image in the lives of the other scientists – often far away – on whom the key actors mutually depended. I will use the examples of a multi-national nuclear networks of Australian, British, Canadian, Indian, Soviet, Pakistani scientists, most of whom trained at the Cavendish Laboratory in Cambridge in the 1930s and 1940s. Contrasts and parallels with the American and French nuclear networks are interesting. What results is a picture of an architecture of disarticulated networks.

Su1: Interlocking Directorates

The structure of the British intercorporate network and its political and social consequences.

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This paper presents results of social structural analyses of intercorporate ties between 500 large British corporations in the late 1990s. The relations linking the corporations in the study are interlocking directorates, directors' old school ties and directors' social club affiliations. This work builds on previous analyses of the British intercorporate network in two ways. First, it partitions the networks created by the three relations according to whether they are made by executives or not. Second it includes all schools and club affiliations in the analyses rather than working with a pre-specified list. Social structural analyses of the networks including centrality measures, regular equivalence blockmodelling and structural equivalence blockmodelling. The results do not support previous characterisations of the British intercorporate network as having an inner circle that takes social and political actions that are consistent with broad classwide interests. Instead of an inner circle, corporations can be distinguished by a variety of interlocking strategies and by the status groups their directors are members of. By viewing the intercorporate network as diversified one is better able to predict corporations political and social behaviour.

Sarbanes-Oxley, board Structure and the corporate board network

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A key objective of the Sarbanes-Oxley Act (2002) (SOX) has been to increase board independence, both in terms

of the proportion of independent directors serving on US public company boards and in terms of the definition of what constitutes 'independence' of a director. The effect has been to increase board size for smaller companies yet reduce the average number of directorships held by the busiest directors and by active CEOs serving as outside directors on other boards. The effect on the board network has been a reduction in the number of multiple interlock relationships among boards, a reduction in the average number of other boards that each board is linked to via shared directors, lower density of links in the board network and a slightly longer average distance between any two pairs of boards that are part of the board network. Interestingly, however, a larger number of the 1500-odd boards of S&P 500, MidCap 400 and SmallCap 600 companies are now linked to at least one other board in the group and the principle component of the corporate board network has grown consistently over the period 2002 to 2005. In 2005 the principle component now links more directors to each other (by varying degrees of separation) than it did in any of the three previous years of the study. The study considers why this might be the case and extrapolates to the governance implications of the observed changes in the board network.

Interlocking Directorate and Corporate Performance in the United Kingdom: Social Network Analysis of Director Interlocks on Layers of Different Profitability

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This paper aims to contribute to research on interlocking directorate and performance by examining some aspects of the structure of directorship ties in British industries. It studies networks of director interlocks on different layers of profitability and compares their main characteristics. The data set for this study comprised 3200 UK registered firms in 2005. Information on the directors was drawn from the Bureau van Dijk FAME database. Seven groups of companies with turnover from £250 million to over £5 billion were studied. Density, degree centrality and indices of centralisation were calculated for each of the groups and then compared.

Our findings show that different layers of profitability have different network characteristics in terms of interlocking directorate. For example, the layer of largest companies has the largest average degree centrality and the network of director interlocks for the group of companies with turnover between £1,5 billion and £2 billion has the largest density.

Analysing very-large networks of political and business elites

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This paper presents preliminary results from a study of political and business elites in Australia. A major element of the research involved the extraction of social network data from large biographical databases. The databases used contain information on the directorships of 65,000 directors of the largest 25,000 companies in Australia, and the career paths, school and university attendance, and club membership of the 33,000 persons in Who's Who in Australia. The paper illustrates the techniques used to extract this data, and demonstrates the valuable insights that large-scale network analysis can bring to the study of political and business elites.

Unintended structural consequences in the recruitment of female directors

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We analyze the recent substantial recruitment of female directors to Swedish company boards, focusing on the structural properties of the interlocking network as well as the strategic positions of female versus male directors.

Su1: Networks, Collective Action and Social Movements B

Pathways to Participation: Network Resources and NGO Participation in Japanese Climate-Change Policy Formation

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University of Tsukuba
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Agenda 21 (passed at the 1992 United Nations Conference on Environment and Development, Rio de Janeiro, Brazil) advocated the participation of all "stakeholder" groups including advocacy NGOs in making national environmental policy, especially in response to climate change. In this view, direct participation should increase

the persuasive capacity of NGOs in the formation of national environmental policy. However, sociologists have long distinguished the contingent relationship between participation and power, either being possible without the other. Governments and powerful interest groups, by picking participants and manipulating processes, can turn advisory committees into "participation without power" thereby legitimating existing government policies. Accordingly, even given participation, the power of NGOs to affect policy content is likely to depend upon the wider balance of power between the state, elites and civil society. This paper examines the social factors affecting the opportunities to and degree of success from participation by a range of Japanese environmental NGOs in climate-change related government advisory committees. This paper tests four plausible social factor hypotheses that could change the balance of power and affect NGO participatory opportunity and success: 1) global diffusion of new participatory norms (i.e., Agenda 21) makes officials/elites more receptive; 2) resource mobilization – the growing resources of domestic NGOs strengthens their capacity to apply political pressure; 3) boomerang effect -- domestic NGOs get international NGOs and governmental organizations (i.e. UN) to pressure Japanese state; 4) state strategy -- the state's existing strategies of governance regularly co-opt NGOs by allowing them to participate. The data come from a policy network survey of 103 domestic organizations (plus 33 international ones) active in the climate change policy domain in Japan in 1997, including all types of actors. In this data, networks indicate resources. The findings show that information ties, membership size, domestic orientation and other factors strongly affected both the opportunity and effectiveness of NGO participation, but that excluded NGOs tended to have greater overall political influence.

Interests, identities, and relations in civic organizational fields

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Although social networks are usually identified as a key component of organizational fields, the density of networks and the distribution of interorganizational ties are rarely taken into account when addressing the issue of field boundaries. In our paper we look at issues of boundary definition in two specific domains of collective action, defined with reference to environmental issues and ethnic and migrants' issues. We draw on evidence collected in two British cities, Bristol and Glasgow, among civic organizations (i.e., participatory organizations, formally independent of the state) acting on either issue as well as on social exclusion and global justice issues. We illustrate how interest in issues combines with actors' identity (both self-defined and hetero-defined) to shape interorganizational networks in the two

cities. We find homo-phily principles in relation to issue interests and identities to operate differently across cities and issues.

Battling Networks of Rival Environmental Social Movements

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The environmentalist social movement and a rival 'Wise-Use' social movement have each generated large inter-organizational networks. We map a pro-environmental social movement network that is created by an expanding selection procedure starting from the Turning Point Project and an anti-environmental network obtained by another expanding selection process starting with the Center for the Defense of Free Enterprise. Shared board ties, shared staff ties, joint projects, and financial flows are all considered. We compare the structure of these networks and note the few organizations common to both networks. We demonstrate also that the Wise-Use network is tightly coupled to a variety of activist right wing foundations and think tanks. We start with the Turning Point Project because it was a set of organizations which joined together to sign full page advertisements in the New York Times in which pro-environmental arguments were endorsed. Although the Foundation for Deep Ecology (FDE) is not a signatory organization, board links and textual analyses suggest it was a prime mover of the Turning Point Project. FDE is also a prime target of the Center for Consumer Freedom (CCF) which attacks environmentalists – both organizations and individuals – with the intent of discrediting them. CCF is also deeply involved in the 'Wise Use' counter social movement dedicated to advancing a radical pro-industry agenda that includes the destruction of the environmentalist social movement in the United States. Board and financial links suggest that it is a front for industry in the guise of a social movement and is better viewed as a well funded counter social movement.

Dynamics and Tensions in American Environmentalism: Organizations, Ideologies, and Events, 1970-2001

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The environmental organizational field has been dynamic partly due to the allied partners and lawsuit cases filed in the United States, 1970-2001. I present a historical network analysis of the evolution of both collaborative and contentious relations among environmental movement organizations (EMOs) in the U.S. in eight consecutive periods. A statistical network analysis pursues mechanisms of network evolution (especially, deletion of positive ties and addition of negative ties). An examina-

tion of the evolution of partition structures reveals both increased complexity and tensions between subgroups (cliques, plus-sets, and role-sets). With all findings, ideological linkages and disjunctions between EMOs are further considered to explain differential participation of the EMOs in a form of collective action, Turning Point Project (1999-2002).

*Network Diversity and
Social Movement Identification*

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Past research has demonstrated distinct effects of personal network degree and network range (diversity) on social movement identification, and social movement participation amongst individuals. This study examines the differential effects of ties to one's own social movement organization versus ties to other SMOs on general social movement identification, versus organizational identification. The analysis utilizes data from members of an environmental organization based in Clayoquot Sound, British Columbia – the site of the largest environmentalist protest mobilization in Canadian history. The analysis incorporates theoretical insights from both the social movements, and social networks literatures.

Su1: Exchange Networks / Game Theory

*Conventions and information in dynamic networks: An
experimental study*

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This paper presents an experimental study on the emergence of conventions in dynamic networks. Conventions are modeled as coordination games in which actors can choose both their behavior and their interaction partners (Jackson and Watts 2002; Buskens et al. 2005). In the first place, we address the question how the extent to which a single convention can be reached depends on the initial structure of the network. Secondly, we study how efficiency of resulting conventions (the extent to which Pareto-optimal conventions are chosen) depend on this initial structure. Third, we study the effects of the availability of information on behavior of others on the emergence of conventions. Predictions on the first two issues are provided by the simulation study in Buskens et al. (2005), which shows that 1) the higher the density of the initial network, the more likely it is that the network will converge to one convention, and 2) the higher the density of the initial network, the more the efficiency in the initial network will determine the efficiency of stable states. Moreover, we extend the existing models by relaxing

assumptions on the information actors have on past behavior of potential interaction partners. New simulation results suggest, somewhat counterintuitively, that less information leads to a higher likelihood that a single convention will be reached. These hypotheses are tested in controlled, computer-guided experiments in which groups of eight actors play coordination games while also choosing their interaction partners. The results are analyzed using macro-level measures as well as actor-oriented statistical models (i.e. SIENA, see Snijders 2001).

*Measuring the sustainability of virtual community of help
by utilizing social network analysis*

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Research investigates network configuration for sustaining the virtual help network and addresses following questions. What is network structure of online community of help with particular attention paid to the degree of exchange equality as a main indicator of sustainability of the virtual community network? In other words, to what degree is exchange of benefits from benefit gainer to benefit giver realized? Also, to what degree is exchange of benefits from the one to others practiced regardless of their benefit gains? Six hypotheses were tested based on the exchange theory, generalized/ balanced reciprocity, homophily theory and the concept of social capital. Three hypotheses test exogenous variables in network analysis while three hypotheses examine endogenous variables. In particular, structural tendency toward 2 mixed star, mutuality, and cyclicity were examined. Importantly, research examines multiple relations on the same set of nodes. Historically, most network research has examined uniplex relations (one relation at a time), but this research explores multiplex relations on just a single set of actors (one-mode networks). (Monge & Contract, 2003, p. 35, Wasserman & Faust, 1994, p.36) Multiple relations identified in this research are travel information; travel companion, free food, free lodge, and free ride on the same set of actors in the case study of Gilbut virtual travel community. Findings will present several strategies adopted and practiced to sustain social capital in the online community of help in addition to the further discussion on if we can use network configuration to provide an indicator measuring the sustainability of online help community.

*The Effects of Resource Variation on Power, Diversity,
and Trust in Exchange Networks*

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This research examines how network structure determines which positions in a network experience greater benefits when different types of resources are exchanged.

I build upon social network and social exchange theories to explain how variation in the resources actors exchange affects outcomes such as power, diversity of benefits, and trust between actors. Two key dimensions of resource variation are identified: duplicability (whether the provider of a resource retains a copy after exchange) and transferability (whether the recipient of a resource can use it in a subsequent exchange). A laboratory experiment is used to test which positions receive the greatest

benefit under different resource conceptualizations. Results of the experiment reveal 1) the advantage provided by a particular network position varies by resource type, and 2) types of benefits are only rarely correlated across positions in a network (with this correlation varying by the type of resource considered).



Sunday Morning Part Two

Su2: Academic Scientific Networks B

*Redundancy of practice network integration
scientific labs.*

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Department of Management

Alessandro Narduzzo
University of Bolzano - Italy

Matteo Prato
University of Navarra - Spain
IESE Business School

The theme of our project is the organization of research in scientific laboratories (an earlier version of this work was presented with the same title at the EGOS Conference 2005 - Berlin). We analyze how scientific evidence and advancements are acquired through a process of socialization of beliefs and practice in the laboratory life. In our perspective, laboratory life is described as an every-day, collective, problem-solving activity involving a variety of actors (i.e. individuals, communities, institutions), at different steps, with various roles (such as research design and research implementation, fund raising, political support, institutional legitimacy).

In this paper we focus our attention on a well defined issue that characterizes such collective problem-solving activity, that is the redundancy of competences that individuals belonging to the same organization or participating to the same community of practice usually exhibit. While organizational knowing and learning is mainly a social phenomenon, redundancy of competences becomes visible at the individual level, when legitimated practice and "how to do" routines spread

around and are performed by a large number of people.

We analyze two research laboratories, the Medical Technology Lab (41 members) and the Oncological Research Lab (36 members), that belong to the Orthopedics Institute Rizzoli (IOR), a leader Italian medical organization that specializes in orthopedics, and ties together clinical activity, scientific research and education. We coded a number of attribute variables for the members of these laboratories, and several kinds of relations among members within each laboratory. We use network autocorrelation models and MRQAP to highlight how network patterns relate to the attributes of laboratory members. We focus on differences among the two laboratories and connect them to more general differences in the organization of work, that were observed during a few months of field observations.

*The Mexican scientific structure: the scientists networks,
institutions related countries*

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In this paper we present new results in the analysis of the Scientific Development of Mexico since 1981 through 2005, based in the information of Thomson Scientific on scientific papers in which there are at least one Mexican author.

We present the International and National Academic networks of major research areas. We are interested in showing the scientific development of Mexico, in particular the national and foreign scientific activity, as is evidenced through productivity in the form of published papers.

We present a general network analysis of the Universi-

dad Nacional Autónoma de México (UNAM), in particular the academic relations between the research Centers and Institutes of the scientific area and the network topologies of those Centers and Institutes.

The whole scientific area network topology should be discussed.

Advice Seeking in a Scholarly Network: Interacting Effects of Homophily Structural Similarity

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The study examined the relational dynamics of advice seeking and consultation in a scholarly network. Using a social network survey supplemented with observations and interviews, the study collected information on personal attributes, types of work and informal relations scholars have with each other, strength of these relations, and their communication preferences. It examined the relationships among scholar's work, interpersonal and communication networks. I used logistic regression models to estimate the odds of advice seeking and consultation. The study found strong support for centrality, network size, tie-strength, proximity and homophily effects in advice seeking.

This research draws on, and contributes to the literature on social networks, organizations, knowledge management, communications and sociology of science by pointing to the relevance of social and intellectual capital in advice and consultation choices.

Social Network Effects in an Emerging Research Community

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Structural and cognitive characteristics in a new scientific community may influence the performance of individuals. We ask under which network conditions researchers profit from a sparse network versus a dense network. While this is not a new question, we in addition look into information advantages by taking into account the cognitive character of the relations of each researcher. The question whether information or structural advantages benefit the production of high quality publications and productivity is answered. Scientific-technical communities provide an interesting case to show how social relations and cognitive abilities influ-

ence output and recognition. A scientific specialty is a community oriented around a coherent set of problems, is recognized by its members and is identifiable as cohesive clusters in citation and co-citation networks. The demographics of a research community and the manner in which research performance is valued, leads to some interesting questions about how relations and cognitive interests shape an individual's position in a community. In research communities seeking relations with others or contributing to the progress of the field, both can contribute to ones visibility and subsequently whether one is sought for cooperation and assistance. We analyze a network derived from webdata and publication information of researchers working on the development of the semantic web. Information was collected on the interconnections and research interests of close to 700 researchers in this area. Local degree centrality, the variety of cognitive sources and structural hole arguments are tested as alternative hypotheses.

Su2: Simulation

Socio-Dynamic Discrete Choice on Networks: Sample Size, Initial Conditions, Geographic Scale, Systematic Omitted Links, Availability of Alternatives

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A wide spectrum of policy measures has been employed over the past decade to address rush hour road congestion the western region of the Netherlands known the "Randstad." The contribution of this paper the treatment of networks of social spatial interactions between households generated feedback dynamics the adoption of various transportation mode alternatives. We consider model where commuter's choice directly influenced the percentages of the commuter's neighbors socio-economic peers making choice, which accounts common unobserved attributes of the choice alternatives the error structure. We explicitly address non-global interactions within several different social spatial network structures, combining advanced econometric estimation with computational techniques the field of multi-agent- based simulation. This paper extends earlier work the authors now systematically exploring various effects of sample size, initial conditions, geographic scale, systematic omitted links, availability of alternatives. Finally, we conclude highlighting limitations of our present study our recommendations future work.

The Tragedy of the Network

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many social contexts, individuals choose set of social interactions to maximize their private benefit, the resulting social network structure public phenomenon that affect members of the network. Previous research (Lazer Friedman 2005) found that more efficient collaborative networks (e.g. small world networks) yield poor system-wide results. this paper, using agent-based modeling evolutionary algorithms, we take the efficiency of the network endogenous to the system of problem-solvers, assuming that individuals choose set of social interactions to maximize their private benefit. We then focus on the social success of actors the resulting structure. Results show that while sparse networks perform better the long run, individual actors will create well-connected network through which information will flow rapidly, resulting poorly performing system. The "tragedy of the network" that everyone acts their best interest, the resulting network will worse everyone. We discuss several examples of this stylized model variety of disciplines.

Incorporating Social Networks Travel Behavior Analysis

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Travel is the price we pay to visit other places: work, the mountain trailhead, a party. Land use patterns and transportation infrastructure provide access to a pool of socio-economic and leisure opportunities, but individual constraints on time, money, and comfort condition actual trip making. The resulting allocation of resources to travel is a bound on the spatial character of the ego network of socio-economic relationships. However, this equilibrium is dynamic, because community itself affects travel choices. While travel behavior analysts have always been aware of the interaction, sociodemographic statistics have been used in a double role to explain travel motives as well as preferences. The discipline has only begun to examine the extent to which social links and their spatial distribution might independently influence travel plans, and vice-versa. The ideal results of improved integration of social networks with spatial mobility include endogenized trip generation in microsimulations, improved forecasts of leisure and joint travel, and tools for evaluating the social capital effects of transportation policies. However, the realism of achieving such goals must be evaluated relative to cost of surveying or modelling social networks. An empirical and a theoretical evaluation project are underway at ETH. First, a pilot survey begun in 2005 of biographical spatial ego-networks is described, with sample results illustrating distance and life history effects on social

geography. An agent microsimulation is also described where social networks emerge as a result of social visits made under the constraints of spatially inhomogeneous travel costs and a budget.

Micro Behavior Macro Structure Context Means of Agent Based Simulation

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Which network structures emerge as a result of which micro behavior at the agent level? The paper shows the outcome of agent based simulation experiments dealing with evolving, growing and altering networks. What are the effects on network measures like degree distribution or network centralities that can be observed by both, different agent strategies (e.g. structural holes strategies, network closure strategies, alternating strategies, random strategies) and group strategies (e.g. coalition forming). The actors are also able to learn by watching successfully actors within their neighborhood. Is there an actor or group strategy that can successfully prevent the emergence of highly centralized single peaked networks? The paper also offers social interpretations at the micro level by knowing macro information. Which conclusion on agent behavior and network culture can be revealed by knowing overall network measures?

Su2: International Networks

A Network Analysis of International Aid Flows

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his paper examines the structure of international aid flows and the relationship between news coverage and international aid allocations. Traditionally, international aid research has focused on the individual nation-state, limiting explanation of aid flows in the global system. World systems theory is proposed to explain the phenomenon. This study examines the pattern of international aid flows using the figures on the volume of bilateral international assistance for 1993 to 2001. Data were obtained from International Development Statistics (IDS), an online database constructed by OECD (2005). It provides detailed information on aid activities, such as volume, sectors, countries (n = 212), and IGOs (n = 39). The results of a network analysis found: 1) international aid flows follow a core-periphery structure. Japan is the most central, in terms of out-degree, followed by the United States, Germany, France, the European Commission (EC), International Development Association (IDA), the United Kingdom, Netherland, and Italy. On the contrary, IDA is the most central in terms of in-de-

gree, followed by the Commission for Environmental Cooperation (CEC), China, Egypt, India, EC, and Indonesia. 2) The relationships between donors and recipients reflect the structural characteristics of international interaction described by Galtung (1971). Also, this study suggests that the bystander intervention model may be used to explain the mechanism of international aid. The model emphasizes the importance of communication among members in a social system. It represents the processes of decision-making on a nation's policy to help other countries and provides the mechanism of international communication that encourages aid. The news media play an important role as agenda-setting agents. The results of a regression analysis reveal that global news media coverage is a significant determinant of international aid controlling for population, GDP per capita, democracy, language, and international trade.

Global Structure of Film Flows: Mapping World Film Trade Between 1996-2004

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While early discussions focused on economics as the central aspect of globalization, growing attention has been drawn to the disorganizing and reorganizing processes of world geography and hierarchy driven by cross-border cultural flows. Current theories find new energy in cross-border cultural flows, making different predictions about global geography and hierarchy. Despite different logics and foci, cultural flows within global networks occupy a central position in these theories. Cross-border cultural flows are weaving new social spaces by compressing space and time, transforming all aspects of social life in network logic, 'disembedding' people from space and time, and 'Americanizing' all spaces in the world. Cultural globalization is characterized by growing regional and local interactions. Spaces of globalization have been described as 'imperialization', 'decentralization', 'polarization', and 'triadization'. This study examined the new cultural geography and hierarchy of globalization based on international film trade among 233 countries and regions from 1996 to 2004. Spaces of global culture are described using network analysis. The underlying structure of global culture is examined by block-modeling. The findings show that film trade is more dynamic than the other global structures such as the economy, finance, and telecommunication. Incoming and outgoing film flows have different patterns, showing different centers – the U.S. in incoming and Canada in outgoing flows. At the center Italy, U.K., France and Korea are competing with the U.S. Although a large portion of film flow concentrated on a small number of countries shows the polarization of global culture, many regional interactions and clusters also exist among the underdeveloped countries.

Networks and Safety Nets: Financial Openness, Trade Relations, and the Welfare State

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For a long time there has been a lively debate about the effects of globalization on the welfare state resulting in a growing body of theories and research aimed at understanding their relationship. Two opposing views dominate the field of inquiry. The first emphasizes that increasing capital mobility and competition severely limits the autonomy of countries with respect to welfare state spending. Proponents of this view state that globalization leads to severe cuts in existing welfare states because financially open countries with extensive social arrangements will not be able to compete with countries where taxes are lower. A second perspective holds that welfare states are not necessarily threatened by globalization. This "upward convergence hypothesis" predicts a positive relationship between globalization and welfare spending based on the argument that financially open countries require large welfare state investments to shield citizens from external shocks caused by insecurities on international markets.

Testing the two hypotheses simultaneously, Bowles & Wagman find that welfare states may be challenged by globalization but that responses to this challenge are far from uniform. The current state of the art concerning research into globalization and the welfare state can be caused by the neglect of internal forces such as political and demographic developments instead of globalization or the possibility that there is no link at all. In this paper, a different possibility is explored, arguing that earlier studies have investigated globalization in a rather narrow fashion. They usually focus on globalization in terms of financial openness (e.g. trade measured as imports and exports relative to GDP). This kind of openness is an attribute of individual countries and doesn't take trade relationships into account. Whether financial openness increases the level of insecurity faced by countries may be affected by such relationships. A financially open country can have trade relationships with only a few or with many countries and these relationships can be more or less stable over time. The level of insecurity that countries face is likely to depend on the structure of the trade relationships with other countries.

While trade networks and relationships are not taken into account in welfare state research, they have been considered in world-system and network theories. However, these studies have not focused on how trade networks and relationships affect the welfare state. This paper brings these two strands of literature together by investigating the extent to which and how these trade networks and relationships affect welfare state effort.

The Emergence of Clusters Global Telecommunications Network

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Studies of international telecommunication networks in the past years have found increases in density, centralization, and integration. Typically, these networks are identified as core-periphery structures with cohesive cores, sparsely connected peripheries, and unequal exchanges between actors. On the other hand, recent studies have identified trends of decentralization and the rise of regionalism in the global network. The present research examines these structural changes in international telephone traffic among 110 countries between 1989 and 1999. It is based on a theoretical model of both core-periphery and cluster structures. The initial results show lowered variances in the degree of inbound and outbound telecommunications traffic among countries, fewer highly centralized countries and more peripheral countries which indicate a trend toward decentralization. Choice and mutuality between countries are tested through p^* and block modeling techniques. Further results show that interactions within countries in blocks of similar economic development status, geographic region, and telecommunications infrastructure development status have increased in general. Specifically, countries with low and medium economic development status, within Asia, Africa, and South America, and with less developed telecommunications status show increased ties. Altogether, increasing interaction among less developed, peripheral countries supports the idea that the global telecommunications network is moving away from a highly centralized and polarized core-periphery structure toward a diversified structure with the emergence of cohesive and interconnected subgroups. The findings have implications for global digital divide and developmental gap issues.

Su2: Communication Networks

Informal Networks in Global Software Development Teams

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In an effort to reduce costs and improve staffing options, American companies are reaching out to other countries, especially India, to staff software development projects.

However, the distribution of teams across multiple locations, time zones and cultures can impede access to critical, timely information. Although advances in communication technologies have made it easier to share information, informal communication between engineers within and across sites is necessary to keep projects on track. In this study we used a network-based approach to study the communication patterns in three successful global project teams to better understand how teams can improve their informal communication. The results indicated that awareness of current tasks, accessibility to other people and common work histories were positively associated with communication within and across work sites. Although there were formal project leaders, most of the teams got their work done through self-organizing sub-groups led by technical leads that coordinated work across functions and sites. Analysis of the extended network of these teams further revealed a dependence on people outside the immediate project team for critical information and advice related to their projects. We offer suggestions for how global development teams can address staffing, communication, knowledge and team practices to overcome the challenges of distance.

*Media Use Personal Support Networks:
A Longitudinal Study*

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This paper explores the findings from a three year study of how communication media influence the structure of personal support networks. Five-hundred respondents from the greater Boston area were given annual mail back surveys consisting of eight name generators and a series of name interpreters. Participants recorded the frequency of communication with alters who provided various forms of social support, including contact by telephone, mobile phone, postal mail, instant messaging, email, and in-person. In addition, participants provided time-use information on their own media use, including time spent watching television and using computers at home and at work. This paper uses multilevel modeling to explore how different media, used either in isolation by participants, or as a means to maintain contact with supportive alters, influenced the structure of personal networks over time. This paper concludes that media use plays a complex although limited role in influencing the size and diversity of personal networks. A more significant role, particularly in relation to 'new media' such as email and Web use, was found when predicting the amount of communication respondents' had in-person with members of their support network.

How to reveal the Informal Structure of Organisations

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Organisational research has been increasingly influenced by the network paradigm during the last years. Research in this field mostly focuses on social capital, the embeddedness of actors in the economic system, the relations between organisations (as firm alliances), the management of knowledge in organisations and so on. Classical sociological organisation research often deals with the difference between “formal and informal” or rather “planned and real” organisation. This approach led to the concept of small groups, the development of informal hierarchies, dysfunction of bureaucracy, micro politics and a variety of organisational models. Astonishingly enough, only few recent studies tie up to this idea. On the other hand, classical research was usually based on extensive field studies. However White et al. (1976) showed, that the analysis of relations between the actors could replace participant observation in some cases. We will tackle the problem from this reference point. The interpretation of organisations as forms of structured communication is due to the system theorist Niklas Luhmann. Following this idea, the formal structure of an organisation should be reflected in the communication behaviour of its members. Consequently, we start from the observation of the communication behaviour of actors in an organisation. The communication acts generate a social network, which may be multiple, because different communication media may be used. We limit our research to the analysis of email-data, because it is known, that email-contacts are related to face-to-face and telephone interactions (model of social integration of interpersonal communication media, Stegbauer 1995). Additionally we take information about the organisational structure, such as the organisational charts, data about the team structure etc. as input for our analysis. This information is used to predict the communication behaviour for the case, that only the planned relations between the actors were decisive. For this purpose a network-model of planned communication is built. In a third step the predictions of this model are compared with the observed communication behaviour. The residual between the observed and the predicted communication behaviour will be used to reveal the informal structure of the organisation. This is done on the basis of a

blockmodel approach, very similar to the classical research done by Harrison White et al.

Multilevel Modeling of Retrieval Behaviors in Transactive Memory Networks

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According to Transactive memory theory (Wegner, 1987), people who work together will begin to learn about what domains other people are knowledgeable. The longer team members work together the more accurate these perceptions should become. Members' perceptions of “who knows what” enabled by communication among team members yields a transactive memory network (TMN). Transactive memory theory posits that team members invoke their directories of “who knows what,” to retrieve domain-specific information from targeted others.

One of the principle benefits of developing a TMN is that it allows team members to retrieve information from others so they can complete their assigned tasks more effectively and efficiently without being required to possess all the expertise required for a task. Prior research has explored the extent to which groups can form a TMN through short-term interactions in experimental lab settings (Hollingshead, 1998; Moreland & Myaskovsky, 2000). More recent research has explored the tenants of TM theory in organizational setting with larger, intact teams (Austin, 2003; Lewis et al, 2005; Palazzolo, 2005).

In this paper we study the extent to which team members communicate to retrieve information from their coworkers based on a set of variables at the individual and team levels. At the individual level we used perceived interdependence and in self-reported expertise as indicators of retrieval behaviors. At the team level we used communication network centralization, communication network segmentation, team size, and team membership. The multilevel hypotheses are tested with hierarchical linear modeling using data collected from 21 intact organizational work teams.

Su2: Statistical Network Models

Implication Structures Household Artifacts: Analyzing the Changing Patterns of Ownership Possession the American Home, 1980-2003

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This paper explores material culture the contemporary American context the changing status of household goods over time. Previously very little attention given to the underlying structure that exists patterns of possession of durables that acquired use the household. , we analyze networks of co-ownership among these goods over two decades, examining the changing relationships between goods over time. Data the paper come multiple waves of the Consumer Expenditure Survey, nationally representative survey of the spending patterns of U.S. consumers. We employ methods of statistical entailment analysis to extract networks of dependence, implication, coexhaustion, exclusion on the ownership of approximately 35 household items the period between 1980 2003. These networks highlight the changing role categories to which various household goods belong during the period studied. Our results implications understanding the hierarchical ordering of household artifacts, which often acquired regardless of purchasing power or fundamental need, these meanings differ some basic demographic characteristics of households.

Social Network Data, Given Error: Evidence for the Construction of Confidence Intervals Network Measures

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We present result tables and exploratory data analysis plots of first-moment statistics for common social network measures. The tables and analysis may lead to the determination of models for the development of viable confidence intervals for social network analysis. By way of virtual experimentation, random error was introduced to a true network, producing a perturbed network, a.k.a., an observed network. We computed and collected measures on these sample un-weighted, symmetrical networks to produce the data tables. The network pairs are compared, results tabulated and plotted. Given an a priori estimate of true-network and observed-network error characteristics, these tables may be further applied as reliable confidence levels around the measures computed from real-life sample social network data.

Model-based clustering social networks

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Network models widely used to represent relations among interacting units or actors. Network data often exhibit transitivity, meaning that two actors that ties to third actor more likely to tied than actors that not, homophily attributes of the actors or dyads, clustering. Interest often focuses on finding clusters of actors or ties, the number of groups the data typically unknown. We propose new model, the Latent Position Cluster Model (LPCM), under which the probability of tie between two actors depends on the distance between them unobserved Euclidean social space, the actors' locations the latent social space arise mixture of distributions, one corresponding to cluster. We propose two estimation methods: two-stage maximum likelihood method, Bayesian MCMC method; the former quicker simpler, the latter performs better. We propose Bayesian way of determining the number of clusters present using approximate conditional Bayes factors. models transitivity, homo-phily attributes clustering simultaneously, not require the number of clusters to known. The model makes easy to simulate realistic networks with clustering, potentially useful inputs to models of more complex systems of which the network part, such epidemic models of infectious disease. We apply the model to two networks of social relations.

How many people do you know in prison?: Using overdispersion in count data to estimate social structure in networks

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People vary in their propensities to form ties to people in specific groups. For example, some people are more likely to know someone in prison than others. Using the "How many x's do you know?" data from Killworth et al. (1998) and McCarty et al. (2001) we show that, using a multi-level overdispersed Poisson regression model, these data can be used to estimate a number of new features of the acquaintanceship network. Just as in Killworth et al. (1998) the data can be used to estimate the variation in individual degrees as well as the sizes of specific sub-populations; however, we show that one can also use this type of data to estimate the variation in individual propensity to form ties to different groups and various features of those propensities. Our work goes beyond

most previous research by using variation, as well as average responses, as a source of information. We find that Americans show great variation in propensity to form ties to people in some groups (e.g., males in prison, the homeless, and American Indians), but little variation for other groups (e.g., twins, people named Michael or Nicole). Motivated by these findings, we will discuss our new project which will use this methodology to study social and political polarization. We will be collecting new data (a module in the 2006 GSS) asking people about their ties to people in different racial groups, lifestyle groups (gays, people who attend religious service every week, women who co-habit before marriage, etc.), and occupational groups (police officer, lawyer, janitor, etc.). The survey will ask about both the acquaintance network and trust network, as well as the social context in which certain types of ties form.

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