Calendar

1999

February

Sunbelt International Social Networks Conference. Feb 17-21. Charleston, SC www.heinz.cmu.edu/project/INSNA/

May

Socio-Economic Research and Geographic Information Systems: 22 - 27 May. Espinho, Portugal.

August

American Sociological Assoc. August 6-10: Chicago, Illinois. http://www.asanet.org/

Academy of Management. August 8-11. Chicago, Illinois. Hyatt Regency Chicago. http://www.aom.pace.edu

Ecological Society of America. Aug 8-12. Spokane, WA. http://esa.sdsc.edu/esa.htm

American Psychological Association. August 20-24, Boston. http://www.apa.org

September

American Political Science Assoc. Sept. 2-5. Atlanta, GA. http://www.apsanet.org/

Society For Psychological Anthropology. Sep 21-26. Albuquerque, NM.
Contact Phil Bock at pbock@unm.edu

November

American Anthropological Assoc. Nov 17-21. Chicago, IL http://www.aaanet.org

2000

April

Sunbelt International Social Networks Conference. Apr 13-16. Vancouver, CANADA www.heinz.cmu.edu/project/INSNA/

August

American Psychological Association. August 4-8, Wash. DC. http://www.apa.org

Ecological Society of America. Aug 6-10. Snowbird, UT. http://esa.sdsc.edu/esa.htm

American Sociological Assoc. August 12-16: Wash. DC. http://www.asanet.org/

Academy of Management. August 13-16. Toronto, CANADA. http://www.aom.pace.edu

American Political Science Assoc. Aug 31-Sept 3. Wash. DC. http://www.apsanet.org/

International Networks Archive at Princeton University

Announcing the International Networks Archive at Princeton University.

http://www/princeton.edu/~ina

The goal of the Archive is to serve as a one-stop resource to researchers doing work on the various networks that make up the international web of globalization. The purpose of the Archive is to support the empirical analysis of globalization by making international network data as widely available as possible. The Archive and its Associates will assemble and standardize data sets, and make them available in a central location so that various indicators can be combined. Associates will agree to post their raw data sets on the Website. Users of data will agree to post preliminary results as well. The point is to create a collaborative space for work that will require more effort than any single individual or organization can ever hope to muster.

For more information, please see:

http://www.princeton.edu/~ina

or contact us at ina@princeton.edu.

CASOS — A Multi-Disciplinary Center for Computational Analysis of Social and Organizational Systems

The past decade has witnessed the initial blending of computer science and social science. On the one hand, there has been an emergence of computational analysis as a subfield within each of the Social and Organizational Sciences; to wit, computational organizational theory, computational sociology, computational economics. On the other hand, there has been a growing need to incorporate social factors into computer science; to wit, multi-agent systems, distributed artificial intelligence, socially intelligent agents. Mathematical and computational methods can be used to study human and engineered systems as computational entities. Human systems, such as groups or organizations, and engineered systems, such as WebBots and robots, can be viewed as inherently computational because many of their activities transform information from one form to another, and because individual and collective activity is frequently information driven. This parallel development of a computational social science and a social computer science is reshaping the way in which we theorize about, explain, analyze, plan, and develop policies and technologies for groups, organizations, markets, institutions and societies.

In response to this changing scientific climate Carnegie Mellon has established a multi-disciplinary center for Computational Analysis of Social and Organizational Systems (CASOS). CASOS is a multi-disciplinary university wide center situated within ICES, the Institute for Complex Engineered Systems. CASOS brings together more than 18 faculty and associated students interested in examining social and organizational systems as computational entities. Faculty are drawn from 5 colleges at CMU: Humanities and Social Sciences (H&SS), Heinz School of Public Policy and Management (Heinz), Graduate School of Industrial Administration (GSIA), School of Computer Science (SCS), and College of Engineering (CIT).

GOALS — Our goal is to create an integrated research and education environment in which students and faculty can engage in the ethical conduct of high impact research building on both computer science and social science in a state-of-the-art intelligent and wireless office and classroom of the future. CASOS aims to foster multidisciplinary research on high impact projects by:

[1] Identifying and supporting new directions and unexploited synergies within the CMU community by linking the social / organizational community and the engineering / computer science community.

[2] Providing a forum for disseminating new results both within and beyond CMU.

[3] Fostering research linkages between CMU and the University of Pittsburgh,

[4] Providing an interface to industry and government for multidisciplinary work that combines social and computational analysis.

[5] Enhancing graduate education by providing a multidisciplinary education and research infrastructure that combines social science and computational science.

Current Research Thrusts — There are a number of ongoing research projects in CASOS that are focused on:

1) Organizational Design — This is a large area comprised of a number of projects including those on: searching for fundamental principles of organizing, coordination and cooperation; large scale qualitative simulation; comparison and extension of constraint based optimization for extremely complex and dynamically changing performance surfaces; optimal and flexible coordination structures for different types of agents (humans, corporations, WebBots, or robots) and tasks; virtual testbeds for determining the social impacts of information technology and its prospects for diffusion, organizational and multiagent learning; tradeoffs between agent quantity and computational complexity, developing tool kits for designing and building agent based models of organizations, teams, markets, and social systems.

2) Adaptation and Evolution — Faculty interests in this area include individual, group, organizational and machine learning. Research is done to develop new concepts, theories, and knowledge about organizing and organization, coordination, adaptation, and evolution at the agent, machine, group, network, organization, market, institution, and societal level. Three areas of particular attention include: adaptive multi-agent models, artificial life, societies and organizations, and organizational learning.

3) Social and Organizational Networks — Faculty interests here include empirical analysis, development of simulation and network based tools and metrics that can be used within and among organizations to better measure and manage the interlocked activities of people and intelligent technologies in terms of their communication and knowledge networks, team mental models and group effectiveness. Work includes the development of empirically driven theory in the areas of diffusion, adaptive and evolutionary social networks, knowledge networks, and inter-and intra-organizational networks.

4) Electronic Commerce — A large number of research projects are being carried out focusing on agent based models to develop tools to facilitate and evaluate electronic commerce. Specific topics include intelligent broker agents, trust and e-commerce, and locating the determinants of the economic success or failure of attempts to sell or buy goods and services on the internet.

5) Vulnerability Analysis — Research here includes developing simulation, multi-agents, social network models for critical infrastructure analysis, vulnerability analysis and information security. A second project is in development of socially sophisticated

information technology systems.

6) Validation and Analysis — Many of the projects in CASOS are tightly linked to data. Researchers are interested in not only developing models, but in their validation and analysis. Thus fundamental research is also being conducted on developing tools and procedures for the computer assisted intelligent validation and analysis of computational models of distributed agent and constraint based optimization systems.

Ph.D. Training Program — Potential graduate students interested in working in the area of computational analysis of social and organizational systems are encouraged to apply to one or more of the following degree programs. Students are admitted to any of these graduate programs and then work inter-disciplinarily and across colleges. Student committees can be drawn from CASOS faculty in various departments, regardless of the student's home department. Also students can, and are encouraged to attend, CASOS related courses outside of their home department. After being admitted to CMU, students can also take part in the certification program in social and organizational networks. Students are encouraged to apply to any of the programs listed below. For each graduate program, the URL for program's graduate application form and a CASOS contact is listed. Applicants should note on their applications that they wish to be associated with CASOS. Additionally, applicants should send a letter or email note to Kathleen Carley describing their interest in the CASOS Ph.D. training program.

Engineering and Public Policy
Benoit Morel bm1v+@andrew.cmu.edu
www.epp.edu/home.html

Electrical and Computer Engineering
Pradeep Khosla pkk@cs.cmu.edu
www.ece.cmu.edu/grad/gradapp.html

Graduate School of Industrial Administration
Stephen Spear ss1f@cyrus.andrew.cmu.edu
bighurt.gsia.cmu.edu/Phd/Contents.html

Heinz School of Public Policy and Management
David Krackhardt krack+@andrew.cmu.edu
www.heinz.cmu.edu/heinz/admissions/phd.html

School of Computer Science
Manuela Veloso
www.cs.cmu.edu/csd/phd/catalog/

Social and Decision Sciences
Kathleen M. Carley kathleen.carley@cs.cmu.edu
hss.cmu.edu/HTML/departments/sds/phd.html

For additional information contact:

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A Time of Many Changes ...

JoSS. David Krackhardt, together with a small group of interested parties, is trying to launch a new electronic journal — the *Journal of Social Structure* — which will feature network analysis as one focus. The journal will be totally web-based, and will enable authors to make use of all kinds of multimedia features, including:

- color
- 3-D graphics
- real-time simulations
- interaction w/ the user
- execution of programs
- distribution of software & data

INSNA will be a sponsor of the journal and has agreed to provide a limited amount of start-up funding. Carnegie Mellon University will be producing the journal and will also be contributing monetarily.

President Everett. At the INSNA business meeting in Charleston, we agreed that Martin Everett (University of Greenwich) would be the next head of INSNA, who, in accordance with our bylaws, will hold a 3-year term beginning January 1st, 2000 (talk about a new beginning!). We also (largely) agreed that, for the sake of professionalism, we should start referring to the head of INSNA as "president" rather than the more informal "coordinator" as we have done in the past.

Martin will be handling subscriptions through the University of Greenwich, so Candy Jones will be stepping down as Subscriptions Manager, and Roberta Chase will be stepping down as Treasurer (in that capacity, she has been handling all the financial transactions of INSNA, from processing credit cards to writing checks to conference hotels).

Editor of Connections. The next co-editors of CONNECTIONS will be Bill Richards and Tom Valente. Like the president, they will serve a 3-year term beginning next January.

Sunbelt 20(00). The **20th** Sunbelt International Social Networks Conference will be held at the Coast Plaza Hotel in Vancouver, Canada from April 13th to April 16th in the year **2000**. The conference will be organized by Bill Richards. For more information, contact Bill at richards@sfu.edu.

INSNA Bylaws. The bylaws of our organization were drafted in late 1993 when I took over as INSNA ~~coordinator~~ president. Frankly, they could use rewriting and updating. I recommend that we do that over the course of this year, so that when Martin takes office in 2000, he has a clear mission and an up-to-date set of rules to guide him. The bylaws can be found on the INSNA website, and are also reprinted in this issue of CONNECTIONS.

Steve Borgatti
El Presidente

By-Laws
International Network for Social Network Analysis
28 December 1993

ARTICLE I. Organization

Section 1. The International Network for Social Network Analysis (INSNA) is a general membership Association.

ARTICLE II. Membership

Section 1. Membership in the Association is open to individuals and institutions upon payment of dues to the Association.

Section 2. There shall be two classes of member: voting Members and non-voting members.

Section 3. Any person having a demonstrable professional or scholarly interest in the study of social networks shall be eligible to be a Member of the Association. A Member in good standing is eligible to:

(a) have one vote in nominating and electing Association officers, and in the transaction of business at the annual meeting of the Association, and in referenda conducted by the Association;

(b) hold elected or appointed office, subject to any limitations imposed by these By-Laws;

(c) participate in annual meetings and receive the Association newsletter and other communications of the Board of Directors to the Members.

Section 4. An institution such as a library, museum, or other scholarly or educational institution shall be eligible for Institutional membership. Institutional members shall be non-voting, but shall receive the Association newsletter and communications from the Board of Directors.

Section 5. For just cause, a member may be deprived of membership by the Board of Directors, subject to appeal to the Members for reinstatement at the next annual meeting.

ARTICLE III. Dues

Section 1. The Board of Directors shall set the annual dues of all membership classes and may establish rates for special categories. The Board of Directors shall review the dues of the Association at least every three years and report its findings to the membership.

Section 2. The Board of Directors shall be empowered to reduce or eliminate dues for Members who are students, are retired, are outstanding contributors to the field, or are spouses of Members.

Section 3. Any member in arrears in the payment of dues shall lose all membership privileges.

ARTICLE IV. Governance

Section 1. Governance of the Association shall be vested in the Members and the Board of Directors.

Section 2. The Members of the Association shall constitute the final authority of the Association and shall elect from their number the elected officers of the Association, as provided in these By-Laws.

Section 3. The Board of Directors of the Association shall:

(a) consist of the elected President and President-Elect of the Association, and one or more representatives elected by the Members.

(b) consist of at least five members elected by the Members for a term of 3 years.

(c) conduct the business, manage the property, adopt the budget, set policy, and care for the general affairs of the Association. It shall fix the annual dues and the date any change in annual dues becomes effective. The Board of Directors may appoint committees, define their duties, and receive their reports.

(d) define non-elected positions as needed and appoint members to these positions, possibly including a Secretary, Treasurer, Executive Director and Editors of Association publications.

(e) meet annually in conjunction with the Annual Meeting of the Association and at such other times as may be necessary on call of the President or one third (1/3) of the Members.

(f) fill any vacancy in the Board of Directors that may occur for any reason, by the affirmative vote of a majority of the then members of the Board of Directors until the next regularly scheduled election.

(g) employ and compensate necessary personnel.

(h) expend Association funds within budget and solicit, accept and expend special funds for special purposes

(i) establish and make known its rules and procedures.

(j) be subject to the general directives and specific limitations of the Members.

ARTICLES V. Officers

Section 1. The Association shall have two classes of officers: (a) officers elected by Members of the Association, including the President, President-Elect, and members of the Board of Directors; (b) officers appointed by the Board of Directors.

Section 2. The term of service for all positions, whether elected or appointed, is three (3) years. Persons may be re-elected and/or re-appointed to offices without limit.

Section 3. The President shall be the presiding officer of the Association and exercise all the duties and responsibilities commonly associated with this office, except as limited by these By-Laws. The President's term of service shall be three years and may be re-elected without limit.

Section 4. The President-Elect shall assume the duties of the President in the event of absence, death, resignation or illness of the President. The President-Elect shall serve for three years as President-Elect and succeed to the office of President at the expiration of the President's term.

Section 5. Newly elected officers shall take office at the conclusion of the final day of the Annual Meeting of the year in which their terms begins.

Section 6. The Board of Directors shall have the right, by a two thirds (2/3) vote, to remove any officer it deems to have devoted insufficient time to the duties of office.

ARTICLE VI. Nominations and Elections

Section 1. Candidates for any elected Association office may be nominated by the Board of Directors or by a minimum of fifteen (15) Members in good standing. All nominations must be made one hundred and twenty (120) days in advance of the Annual Meetings of the Association, and communicated to the Members ninety (90) days in advance of the Meetings.

Section 2. The Board of Directors shall inform the prospective nominee of the probable extent of the burden of the office. A nomination becomes effective only when the nominee files with the Board a statement of willingness and ability to devote such time to the affairs of the Association as necessary to the effective execution of office.

ARTICLE VII. Referenda

Section 1. A referendum may be conducted by mail ballot at any time upon initiation of the President, Board of Directors, or signed petition of twenty five (25) members in good standing. A majority of votes received shall constitute a favorable vote.

ARTICLE VIII. Balloting

Section 1. A Member in good standing shall be entitled to cast one (1) vote in any Association election or referendum.

Section 2. Ballots shall be secret and enclosed in a signed envelope. The Board of Directors shall have the authority to examine the eligibility of any voter.

Section 3. Thirty (30) days shall be allowed for the return of ballots. Ballots must be received by the Board of Directors not later than the stated return date to be counted.

Section 4. The candidate receiving the most votes for a contested office shall be elected; the Board of Directors shall hold a run-off election within ninety (90) days to resolve all ties.

ARTICLE IX. Quorum

Section 1. Thirty five (35) Members in good standing shall constitute a quorum for transacting business at the Annual Business Meeting.

Section 2. A majority of the members of the Board of Directors shall constitute a quorum for transacting business.

ARTICLE X. Finances and Property

Section 1. The fiscal year of the Association shall correspond to the calendar year (January 1 through December 31).

Section 2. Payments previously made to establish Life Memberships and other designated moneys as they become available shall be regarded as a permanent fund, which may be invested in the interest of the Association. Sums of money may be drawn from the the capital of the permanent fund, but at no time shall its total be reduced to less than an amount equal to the total payments of all living Life Members. Income from annual dues, interest from investments, and money from other sources may be regarded as a working fund, available for payment of all expenses, and for investment.

Section 3. The President shall sign all written contracts and obligations.

ARTICLE XI. Special Meetings

Section 1. Special meetings of the Association may be called by the President, President-elect, Board of Directors or upon written request of fifty (50) Members in good standing.

Section 2. Written notice stating the place, day, and hour of a special meeting and all purposes for which the meeting is called shall be delivered to Members not less than thirty (30) days before the date of the meeting by publication in a prominent place in the Association newsletter, mailed to each Member at the last address in the Association's membership records, postage prepaid.

ARTICLE XII. Annual Meeting

Section 1. The place and date of the next Annual Meeting shall be determined by the Board of Directors within thirty (30) days of the each Annual meeting.

Section 2. The Annual Meeting shall consist of (a) a Scientific Conference in which Members present papers accepted by the Conference Organizer, and (b) a Business Meeting of the Association. The Scientific Conference shall be open to anyone paying the registration fee. The Business Meeting is limited to Members of the Association in good standing, and any other persons that the Board of Directors may designate.

Section 3. Provision (a). New legislation or resolutions proposed by Members for consideration at the Annual Business Meeting must be received in writing by the President at least thirty (30) days in advance of the Annual Meeting in order to guarantee inclusion on the agenda. A copy of the agenda shall be furnished to all Members upon registration at the Annual Meeting or twenty-four (24) hours before the Annual Business Meeting. Resolutions passed at the Business Meeting shall be subject to a mail ballot of the Members as set forth in Article VIII of these By-Laws. With the exception of motions having to do with procedural matters relating to the meeting itself, all motions passed at the Business Meeting shall thereafter be called Proposed Resolutions and , as with Resolutions passed at the Business Meeting, every Proposed Resolution shall be similarly subject to a mail ballot of the Members. A majority of votes cast shall constitute a favorable result.

Section 3, Provision (b). Notwithstanding the preceding provision, if two-thirds (2/3) of the Members present at the Annual Business Meeting (and these form a quorum) vote to suspend the rules, motions advisory to the Board of Directors shall be allowed for introduction, deliberation and vote by the Members present. A majority of votes cast shall constitute a favorable result and a recommendation to the Board of Directors for action during the Annual Meeting. The actions taken by the Board upon motions approved by the assembled Members shall be reported in the next issue of the Association newsletter.

Section 4. The Business Meeting shall be conducted according to the most recent revision of Robert's Rules of Order.

Section 5. The Board of Directors of the Association shall appoint a Conference Organizer who shall organize the next Annual Scientific Meeting. The Conference Organizer will work with the President to choose the facilities, costs, contents and other aspects of the next Annual Meeting.

ARTICLE XIII. Annual Report

Section 1. At the time of each Annual Meeting, the President shall report the activities of the Board of Directors during the previous year. Disapproval of activities or commitments made by the Board, and any mandates for action different from those taken by the Board of Directors shall require a majority vote of the Members. Directives for new activities and expenditures may also be initiated by majority vote of the Members.

ARTICLE XIV. Annual Audit

Section 1. The Board of Directors shall make an annual audit of Association financial records, in which task it may choose to employ a certified public accountant.

ARTICLE XV. Amendment

Section 1. These By-Laws may be amended by the Members by mail ballot, provided that a proposed amendment is approved by a majority of the votes cast.

Section 2. Amendments may be proposed by the Board of Directors or by thirty five (35) Members in good standing. The Board of Directors shall publish the proposed amendment in the Association newsletter and circulate it to Members with the ballot, allowing not less than thirty (30) days for the return of ballots.

Section 3. The amendments and provisions of these By-Laws shall be effective immediately upon adoption and shall supersede and nullify all previous amendments and provisions.

2000 SUNBELT 20
INTERNATIONAL SOCIAL NETWORK CONFERENCE

Coast Plaza Hotel, Vancouver, CANADA
April 13 - April 16, 2000

The Conference: The International Sunbelt Social Network Conference is a major forum for social scientists, mathematicians, computer scientists, and all others interested in social networks. The conference provides an opportunity for individuals interested in theory, methods, or applications of social networks to share ideas and common concerns. Sponsors of Sunbelt XIX are the International Network for Social Network Analysis (INSNA) and the Department of Sociology at the University of South Carolina.

The Program: Typical session topics include: Corporate and Inter-organizational networks; Intra-organizational Networks; Personal Community Networks; Networks and Health; Networks and Game Theory; Diffusion; Networks Through Time; Social Support; Cognitive Networks; Biological Networks; HIV/AIDS; Communication Networks; Network Exchange; Methods and Statistics for Network Analysis. If you wish to organize a session, contact the organizer.

The Keynote Speaker: Linton C. Freeman, School of Social Sciences, University of California, Irvine.

Special Event: A festschrift for Lin Freeman will take place on Sunday afternoon and will culminate in a celebratory dinner. David Krackhardt (krack@cmu.edu) is the chief organizer.

Workshops: Workshops typically include: Steve Borgatti and Martin Everett's "Introduction to the Analysis of Network Data"; Lin Freeman "Generating Images of Networks"; Stanley Wasserman and Company "Statistical Methods for Social Networks," and Barry Wellman's "A Non-Technical Introduction to Social Network Analysis".

To Submit A Paper: To submit a paper, send an abstract of no more than 200 words by email or in an ASCII file on diskette for DOS platforms and a hard copy to one of the organizers no later than January 10, 2000 (this is a tentative deadline). Submission of more than one multiple-authored paper is usually acceptable. But, as always, it may be necessary to limit program participation to the equivalent of one single-authored paper per person.

Organizer: The 2000 conference is organized by Bill Richards. You can reach him at the following addresses:

William Richards
School of Communication
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CANADA

Voice: +1 604 251 3272
Fax: +1 604 291 4024
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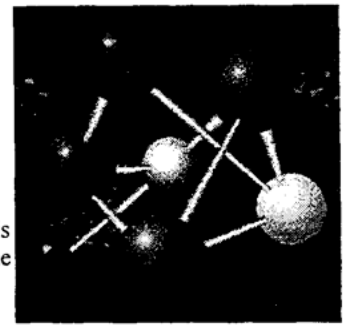
Web: http://www.sfu.ca/~richards/

Ties & Bonds



Ties & Bonds is a regular column written by Barry Wellman. The contents of this column are solely determined by Barry Wellman and do not necessarily reflect the opinions or concerns of INSNA. Contact Barry at wellman@chass.utoronto.ca.

BBS *[Barry's Bulletin-Board Service]*

Köln anthropologist ***Thomas** Schweizer* died 3/99 after a lengthy bout with leukemia (including multiple courses of chemotherapy). I had just seen Thomas at the Sunbelt 2 weeks earlier, and I didn't have an inkling of an illness. As always, he was the leader of a scintillating group of German graduate students and one of the most constructive people in our business. I miss him terribly... It's been a sad year for German networkers: ***Birgette Hummell*** (wife of Hans Joachim Hummell) died much too young in 1998... Structural analytic anthropologist *Eric Wolf* died March, 1999. A clear and imaginative leader in his profession at U Michigan & Lehman Col, CUNY, I personally valued his ideas when developing models of Saved and Liberated communities. (See his "Kinship, Friendship and Patron-Client Relations" in *The Social Anthropology of Complex Societies*, edited by Michael Banton. London: Tavistock: 1-22.).... [redacted]

....***Rebecca Adams*** promoted to Full Prof, Soc, U North Carolina - Greensboro.... Marc ***Smith*** now employed by Microsoft Research for further development of *Netscan*.... ***Katherine Giuffre*** (Soc, Colorado Col) awarded McArthur Fellowship, 99-01.... ***Perri 6*** from Demos to Dept of Govt, Univ of Strathclyde, UK (although he'll continue being based in London: perri@stepney-green.demon.co.uk.... ***Barry Wellman*** spent Spring, 1999 as Visiting Prof., School of Information Systems and Management, U California, Berkeley.... ***Ruey-Ming Tsay*** (Soc, Taichung U, Taiwan) to spend 1999-2000 academic year at Heinz Business Schl, Carnegie Mellon U.... ***Kathleen Carley*** the founding head of Carnegie Mellon's new Center for Computational Analysis of Social and Organizational Systems (CASOS). She reports that CMU & Pitt are to offer a joint social network certificate program.... ***Richard Alba*** visiting scholar at Russell Sage Fdn 1998-1999.... Networkers running for AmerSocAssoc office: Veep: ***Richard Alba*** (SUNY-Albany); Council: ***Paul DiMaggio*** (Princeton); Cttee on Publications: ***Bernice Pescosolido*** (Indiana), Guillermina Jasso (NYU); Cttee on Nominations: ***Cecilia Ridgeway*** (Stanford).... ***Caroline Haythornthwaite*** (Lib&Info Sci, U Illinois) won the 1999 "Research Paper Award" from the Assoc of Library & Info Sci Educators for her "Network Structures among Computer-supported Distance Learners: Multiple Relations, Multiple Media and Time"....

Two Schools To Watch! ***Daphna Carmeli, Gustavo Mesch & Ilan Talmud*** all promoted to Sr Lecturer, U Haifa, Israel... ***Doug McAdam*** to Soc, Stanford from U Arizona.... ***Woody*** Powell to Educ & Scan. Ctr, Stanford from U Arizona.... ***Karen Cook*** spent 1998-1999 at Center for Advanced Studies, Palo Alto, and then going down the road to join Soc, Stanford....

Geeks as Sex Symbols

When us guys were slaving away to figure out block modelling, we dreamed we might be famous one day and even help humanity. But sex symbols? Arthur Miller & Marilyn seemed an anomaly rather than a forerunner. Thanks to Bill Gates, the Silicon Valley and MS millionaires, it's now hip to be a geek. See Caity McPherson (a "porntrepreneur" in SV) article on Playboy.com, article, "For the Love of Smart Men."

> I have a special fetish. It's not for leather, high heels or stockings, nor is it for particular body parts. My fetish is men with glasses, laptops and frail bodies that haven't seen daylight in weeks. It's men who can recite the latest technological innovations and articulate the importance of 0's and 1's while I swoon. Talk digital to me baby.

McPherson recalls a recent visit to the gym where "two very pretty women" were talking about guys:

> I'm not looking for the handsome hunk, coming to the rescue on a white horse. I'm looking for a man who can tell me why my computer is crashing.

And *Cryptic Seduction*, a geek-centered porn movie is coming out soon. Cyberpunk producer Randy French says it's a male geek version of porn with gorgeous techie girls who not only understand crypto technology but are turned on by the technological expertise of the coders. In one scene, 2 characters have sex beneath a poster for the Electronic Frontier Foundation. If you want to join the movement, the *Geek Pride Festival* will be in Boston, Oct 1-3, 1999, and webcast on www.geekpride .org. Organizer Tim Mceachern says:

> There needs to be more geek-to-geek social awareness. The only thing holding us back is isolation. We need to see each other face to face and have a few beers.... Not everyone has a T1 connection to the Internet or thinks that technology is cool, but we're hoping to change that.

[Source: David Needle, "Porn Peddlers Primp for Pocket Protector Crowd," *Silicon Valley TechWeek*, March 8, 1999: p. 4].

Network Communities

A Hot New Market in Cyberspace? I've been arguing for decades that communities are best described as social networks. It's been easier to convince computer scientists than social scientists, for the computer scientists "port over" (a nice comp. sci metaphor) their understanding of computer networks to thinking about social networks as "virtual communities."

But until 3/99, I didn't realize that folks are dreaming of making big money with a certain kind of virtual community. I was fascinated at a "New Media" conference (at Cal-Berkeley) to meet a genuine "Vice President, Community, " Jenna Woodul, cofounder of *TalkCity*, "www.talkcity.com" (partially owned by Hearst and NBC) which hosts "thousands" of chats. I heard that approx. 4M persons (IP addresses really) visit monthly. Certainly the site is well done as is. "www.women.com", run by another panelist (their "storksite" -- aimed at women pre/after giving birth -- is especially active).

The folks in this conference all saw commercial potential in creating, facilitating (and selling ad sponsorships to) "virtual communities", defined (by them) as interest-based chat rooms, listservs, bulletin boards. In other words, computer-based social network as community – usually without an explicit spatial constraint. (Although a cursory look at TalkCity did find current events rooms devoted to New Orleans and Seattle (the latest in lattes?).

Silicon Valley is a Network (as well as a place and a state of mind): "Even at its most capitalistically extreme, the production of software resembles the workings of political processes or the scientific community or both as much as, or even more than, it resembles Adam Smith's market." [Phil Agre, "Notes and Recommendations," *Red Rock Eater [listserv] News Service,* 26 March 99].

Social Networks and Computer Viruses

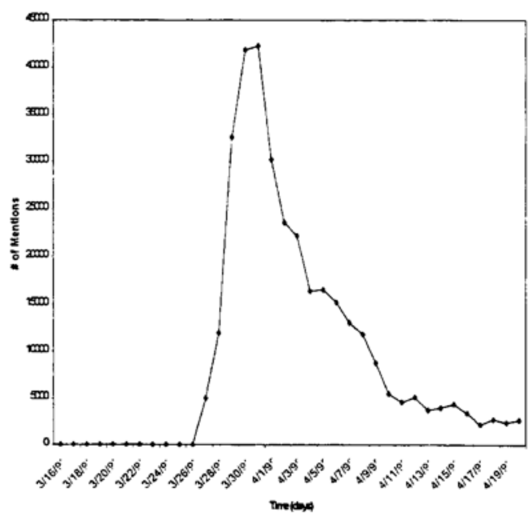
Berkeley, CA, March 29, 1999: While waiting to drive Bev to San Francisco airport to fly to Toronto, I found a message in my e-mail from our friend Ina in Jerusalem telling us that today's *NY Times* was warning about a new computer virus (really a "worm"). It's not just that globalized me was able to put 5 cities into the preceding sentence without using a list, but that information (including viruses) can spread by the Internet without much regard for distances. (A lemma though: A small self-study in my course recently revealed that more than half of all e-messages received by the students in one day were local. See the note below: "Is email less of a local village than we think?".) The "Melissa" virus (or "Mailessa" as Mark Granovetter styles it) strikes me as the world's first cyberMilgram "small worlds" virus, one that can cover the world with 7 degrees of separation. Fifty to the 7th is 78.1 billion. Of course it isn't so easy: You have to make huge allowances for redundancies in the network's snowballing because your friends tend to know each other (and send viruses to each other more often than to the rest of the world). See Harrison White. 1970. "Search Parameters for the Small World Problem." Social Forces 49: 259-64. Or see Ed Laumann, et al., *Sex in America,* for why we all don't have AIDS (and, by extension, won't get all Melissa'ed). And in practice, many chains just don't get through. In a paper given at Sunbelt '96, Aaron Dantowitz and I reported that 72% of the "small world" email chains we traced stopped after one or two links. Only one made it to its target.

ZDNet tells me that the Melissa virus is really a *Microsoft Word* macro that attaches to each outgoing file if there is a link between *MS Word* and either *MS Outlook* or *MS Outlook Express*.. It spreads by going into your address book and copying the first 50 names and e-mail addresses. (Isn't this the dark side of Microsoft's vaunted tight coupling between programs. If MS asks me yet again, "Where do you want to go today," I shall loudly tell them: "Not updating my virus checker yet again!") Melissa sends to each of these 50 addresses sends a separate message with the header, "Important Message From <Application.> <UserName.>" The body of the text reads "Here is that document you asked for ... don't show anyone else" and contains a list of pornographic Web sites. It reportedly creates the following entry in the registry: HKEY CURRENTUSER/Software/Microsoft/Office/ "Melissa?"

Talk about diffusion of information, this virus moved fast! Here is a daily tracking by my Berkeley computer science student Danyel Fisher of how often "Melissa" and "virus" were mentioned on DejaNews,a search engine for online newsgroups.

Date	# of Posts	Date	# of Posts
16-Mar	3	3-Apr	22149
17-Mar	0	4-Apr	16374
18-Mar	3	5-Apr	16505
19-Mar	2	6-Apr	15192
20-Mar	2	7-Apr	13027
21-Mar	0	8-Apr	11845
22-Mar	0	9-Apr	8761
23-Mar	0	10-Apr	5479
24-Mar	2	11-Apr	4593
25-Mar	8	12-Apr	5126
26-Mar	13	13-Apr	3736
27-Mar	5004	14-Apr	3966
28-Mar	11952	15-Apr	4394
29-Mar	32577	16-Apr	3407
30-Mar	41817	17-Apr	2206
31-Mar	42264	18-Apr	2745
1-Apr	30188	19-Apr	2402
2-Apr	23560	20-Apr	2671

(Those early mentions intrigue me although I assume they are just noise). It's not quite a normal distribution, with abrupt early rise and later straggle. A log transform would normalize it a bit.



The experimentalist part of me muses that if only there were an e-mail tracker attached, we'd have a reasonable small world, diffusion of information, experiment, assuming the first 50 names were an unbiased sample. However, I doubt that this would pass a Human Subjects review committee. (Come to think of it, didn't such committees start in the social sciences in response to Stan Milgram's "obedience to authority" experiment?)

The Melissa virus appears only to have attacked *Microsoft Outlook* and *Outlook Express* address books, and it appears to infest systems only if they open a Microsoft Word .doc file attachment. If you have one of those aggressive e-mailers (such as *Eudora Pro*, I believe) that can be set to open all .doc attachments automatically on receipt, turn it off ***Now***. I do feel smugly secure as I use simple *Pine* as my e-mailer and less fashionable (but more controllable) *Word Perfect* as my word processor. (Although it is no doubt true that MS Word's market dominance is heavily due to MS' bundling tactics, I believe that MS Word also succeeded because its very lack of controllability made it more attractive to large organizations with pink collar minions who didn't want to, didn't know how to, and weren't wanted to make their own word processing decisions. The templates do it for you, whether you want them too or not.)

Hal Varian, the Dean of the Univ. Cal-Berkeley School of Info Systems and Management, tells me that Melissa "is very close in design to the Morris Worm [the first widely proliferated Internet worm in1988] that used Emacs in the same way that Melissa is using Microsoft Word. Of course the 'world' was much smaller back then."

I was amused to learn that Morris, the 1988 worm progenitor, is reportedly the current security guru at Yahoo, surely a result of "It takes a thief to catch a thief" analysis. Also germane is what U.S President Lyndon Johnson said in the 1960s when an aide raised the question of firing FBI Director J. Edgar Hoover. "Better to have him inside the tent pissing out than inside the tent pissing in." In a Mertonian "shoulders? of giants" web quest, I've traced this idea back to that champion of political correctness, U.S. President Woodrow Wilson. At the 1912 presidential convention, when the opinionated William Jennings Bryan "wanted to be on the platform committee, and a lot of people didn't want him. They went to Wilson, and he told them, 'I'd rather have him inside the tent pissing out than outside pissing in.'" [Former North Carolina Governor Terry Sanford, as quoted in David Arneke, "Remembrances, Trinity '75." *Duke University Chronicle,* April 22, 1998. http://www.chronicle.duke.edu/chronicle/1998/04/22/s07DavidArneke.html]. Sounds like there should be a doctoral thesis on the penile fixation of American presidents in the 20th century.

But I digress from social networks. So a concluding thought: Could this be an anti-MS plot? If Morris, the original internet worm runner, were at Netscape, Sun or Oracle rather than at more MS-friendly Yahoo, some would really start thinking that conspiracy theory is meeting diffusion networks. Or should NATO be thinking "Serbian cyberwar" on the day after the allegedly "untraceable" U.S. Stealth fighter was shot down?

Short Schticks

Geneologies: When Ron Burt was a Johns Hopkins undergrad, the mentor who turned him onto to Sociology was ***Nan Lin.***

New Book: Nan Lin's *Social Resources and Social Capital* is being published by Cambridge Univ Press in 2000.

An Article I'd Love to Write If I had Time: "If All the World Were a Business School: Darwinistic and Cooperative Views of the World."

Worst Academic Pun of All Time? "The paradigms don't always add up to 20 cents." [Doug Sweet, *Montreal Gazette,* 31July98:A5, reporting on the World Congress of Sociology]

Word Play: As do most of you, I spend a fair amount of time dealing with copy editors. Except now they prefer to be called "language therapists". As copy paper no longer exists (although I have a box of carbons in my desk), reporters no longer file copy: they "provide content." [William Safire, "The Summer of This Content," *NY Times Magazine,* sometime in Summer, 1998]

Field Methods: Russ Bernard has founded a "new" journal, *Field Methods,* to be published by Sage. This is a transformation and formalization of Russ' longstanding *Cultural Anthropology Methods.* My hope (and expectation) is that in its new guise it will be as wide-ranging and innovative as its predecessor. Among the networking kibitzers on the editorial board are Steve Borgatti, Jeffrey Johnson, David Morgan, Gery Ryan, and me.

Deal Flows: Marty Yudkovitz, in charge of developing NBC's interactive businesses, "is a bald, brash scrapper with the disposition of an osprey, always on the lookout for any deal that might score cash for NBC's offers. 'When you are out there, playing the game, the deal flow occurs. You find yourself in the middle of the deal flow, you find yourself in the information flow, you have a seat at the strategic table." [Randall Rothenberg, "Go Ahead, Kill Your Television: NBC is Ready," *Wired,* 12/98:260].

Does Emotional Intelligence Make Up for Little Social Presence?: "The increasing reliance on communication via the Web and email — if it replaces human touchpoints — weakens the fabric of connectedness that makes a company or organization work. That's why E.I. [Emotional Intelligence] is so important." Daniel Goleman, hyping his book, *Working with Emotional Intelligence*, in *Wired,* 12/98: 209.

Holland-Leinhardt-Davis & Simmel Alive and Well in Canada: Here's the ultimate triadic author's bio, in a laudatory *Toronto Globe & Mail* piece about former Canadian Prime Minister Pierre Trudeau: "Michael Valpy is married to constitutional lawyer Deborah Coyne. Their book, *To Match a Dream: A Practical Guide to Canada's Constitution,* has just been published.... Pierre Trudeau is the father of Ms. Coyne's daughter." There's a picture in the same issue of Pierre, then-wife Margaret Trudeau, and his then-love guitarist Liona Boyd.

Who'll Be the First? In the early 1970s, I attended a small invited conference in which 1 of the presenters was so sure that he'd win the Nobel prize that he made us sign confidentiality statements. I giggled. But now, I giggle less. The economics Nobel (created in 1969) has been opened up to the other social sciences in what the *NY* Times calls "a seismic yet unannounced shift. The [Swedish] academy, reacting to internal criticism over the quality of past and prospective recipients, essentially broadened the prize.... In a sweeping rule change, the academy also purged the prize committee of the generation that had controlled the prize since its inception & demanded that noneconomists be included in the 7-member prize committee" (15Oct98: C1-

C2). None of us, but with Amartya Sen this year and Gary Becker a bit earlier, things are getting closer. (And thanks to the same article I now know that Sen is married to Emma Rothschild.)

The Universe is a Social Network: Not only because of string theory, but because current cosmology has finally realized what network analysts knew all the time: "The importance of mergers in the evolution of galaxies: Galaxies appear to develop from the bottom up, not the top down. That is, they begin as smaller objects, which are prevalent in the early universe, and grow into larger galaxies and groups of galaxies, instead of extraordinarily large structures that break into galaxies." [John Noble Wilford, "A New Baby Picture of the Southern Sky," *New York Times*, 24Nov98: D5.]

The Global Village Isn't So Global

Keith Hampton and I have been suggesting that the Internet breeds ***"glocalization"***: interactions that are both *global* -- because they are only trivially constrained by spatial proximity -- and *local* -- because people are tethered at home, office or Starbucks to their desktop wires while communicating (at least until broadband wireless comes about).

But despite the easy talk about the "global village," how global are interactions? I do not know of any published study that addresses this, so my students* and I did a quick-and-dirty (see table next page). The data are seriously biased of course, but at least for this group of highly computer literate Berkeley graduate students, the evidence is clear: Email is as much local as global, even when I construct a simple bipartite view according to Berkeley, with a simple "Elsewhere" category.

Now I have been talking about nonlocal "network communities" for thirty years. In part, this is because I like to be counter-intuitive when almost all others are talking about "neighborhood communities." So I am intrigued that this little study suggests that the global village isn't so global after all.

*My thanks to the graduate students in my Information in Society course at the School of Information Management and Systems, University of California, Berkeley. In addition to SIMS students, there were computer scientists, sociologists, a planner, an architect and an industrial engineer. The common denominators are that all are (a) students -- hence the plethora of formal communications, and (b) spent much time at computers.

Table 1: Type of Email by Location of Sender

	Berke-ley	Bay Area	US A	World	Row %	Row N
Informal - Single	18	13	8	5	18	44
Informal -Multi-	22	7	6	1	15	36
Formal - Single	20	7	1	3	13	31
Formal -Multiple	27	1	0	0	11	28
Lists	54	10	33	7	42	104
Spam	1	0	3	1	2	5
Column %	57	15	21	7	100	
Column N	142	38	51	17		248

Cell values are raw frequencies obtained by totaling all respondents' numbers for email sent *To* them. Berkeley + Bay Area = 72%. Single (one-to-one) messages = 33%. Multiple (one-to-several) messages = 24%. Informal messages = 31%. Formal messages + Lists = 68%. Berkeley Lists = 22%. Data Collected, Thursday, Feb 25, 1999, 24 Hours (10 Respondents). Mean Number of Messages = 25. Median Number of Messages = 30. Modal Number of Messages = 16 and 39.

Table 2: Email: Local (Berkeley)-NonLocal by Informal-Formal-List

	Berkeley	Elsewhere	Row %	Row Size
Informal	51% (38)	49% (37)	30%	75
Formal	77% (49)	23% (15)	26%	64
List & Spam	50% (55)	50% (54)	44%	109
Column %	57%	43%	100	
Column N	142	106		248

Informal: Email between friends, relatives, lovers, etc. *Formal*: Bureaucratic stuff sent to the person. This would include corporate communications, notes from professors. *List & Spam:* Email sent to list subscribers plus unwanted spam. (Taking spam out doesn't change things much.).

Thomas Schweizer Remembered
by Douglas R. White[1]
University of California, Irvine

Networks, Cognition and Ethnography

Thomas Schweizer 1949-99

One of the leading European anthropologists, a devotee of network research, cognitive and comparative anthropology, is dead at the age of forty nine. Thomas Schweizer, Director of the Institute of Ethnology at the University of Cologne, Germany, died on March 1, of complications resulting from Leukemia.

For his outstanding work in science and institution building, Schweizer became the first anthropologist ever to win the prestigious Leibniz five year award of the DFG (Germany's NSF) in 1995. The Leibniz award provides young senior scientists with "nonbureaucratic" funding in the "prime time" of their academic careers. Schweizer - free to choose what to do with funding - dedicated it to launch a major project on networks and cognition involving graduate students at Cologne and colleagues from abroad - Irvine, Florida, Paris and Caen. While he supported 7 graduate students to do fieldwork and to write their Ph.D. thesis under that common framework, he took the time for theoretical and comparative, empirical synthesis. The first major outcome was a book published in German on "Patterns of Social Order: Network Analysis as a Foundation for Cultural Anthropology" (*Muster Sozialer Ordnung* 1996). A second book, on *Social Networks and Ethnography: Rethinking the Foundations of Social/Cultural Anthropology* was in progress as the finale to the project. In the manuscript, he argues that the fundamental building blocks of society, economy, politics and communication are networks of actors connected by such ties as kinship, friendship, economic exchange, and social support. Network analysis is able to arrive at structural descriptions of patterns of social action as well as explanations of strategic action and their complex outcomes. The explanatory model is enriched and grounded, however, when cognitive anthropological methods are used to elicit actor schemas that circumscribe the decision-making of actors within network constraints. The network paradigm not only accounts for structure and dynamics of social action internal to a

[1]Thanks to Margarete and Nikolaus Schweizer, as well as Michael Schnegg and Michael Casimir for their help in putting together this brief biography.

society/economy/polity or local context, but is used to represent the embedding of local cases in the larger context through specific patterns of network ties.

The evolution of Schweizer's visionary approach to network thinking and empirical approaches in anthropology can be divided into three overlapping phases of his career. I) First came his dissertation and subsequent work on comparative (cross-cultural) testing of anthropological theories. II) Next, his fieldwork with Margarete Schweizer in a village in Java, publication of numerous ethnographic articles on Indonesia, and the culminating publication as a book of his Habilitation thesis which qualified him to enter the tenured professorial ranks. III) Third, beginning with some analyses of his Javanese materials, he turned to processual, structural and network analysis and undertook a rigorous integration of ethnographic and comparative work.

I. Cross-Cultural Research 1968-1983

Thomas Schweizer began his career at Cologne in 1968/69 under Dr. Ulla Johansen, and became Institute Director in 1973. After completing his thesis in 1975, he published his dissertation on "Methodological Problems of Cross-Cultural Research" in 1978. As a cross-culturalist myself this was when I became aware of his work: we had as a Ph.D. candidate at Irvine, another Cologne student, Waltraud Kokot, and she agreed to help me review the book (in German) for the American Anthropologist (1980). The book was translated and published by HRAF press in 1987. In between Schweizer published a wide range of cross-cultural studies. Methodologically, he covered data quality controls (1978), the use of scaling, regression, and factor analytic methods (1978a,b, 1980). Theoretically, he tested Whiting's puberty and initiations hypotheses (1978c) and correlates of alcohol use (1981). Finally, in an introduction to Ethnological Research (1983), his chapter provided an introduction to cross-cultural methods. His work represented a high point of methodological and theoretical sophistication in the anthropological development of cross-cultural studies.

II. Javanese Fieldwork (1978-), Habilitation (1984) and Cologne Reappointment

Schweizer brought his quantitative, hypothesis-testing orientation to ethnographic analysis in his 1978/9 and 1984 fieldwork with Margarete Schweizer, who was skilled both in ethnography and linguistics. The fieldwork resulted in a large number of publications which ranged from empirical methods in fieldwork (1981), qualitative methods (1987) and economics (1980, 1985, 1989) to issues of stratification (1985). This work culminated in his Habilitation (*Reisanbau in einem javanischen Dorf* 1984) which was published in 1989. He moved on to a Heisenberg Stipend at Cologne (1984-86), to a Professorship at Bayreuth (1986) and then a permanent position at Tübingen 1986-1990.

In 1988, with Cologne colleague Hartmut Lang, Schweizer was funded by the DFG to conduct a grand tour of cross-cultural research projects in the U.S. (HRAF, Irvine and elsewhere) as part of a funded research project on causes and consequences of conflict that combined cross-cultural studies with six ethnographic field studies by University of Cologne/Tübingen graduate students. This trip provided my first face-to-face discussions with Thomas, and led to my invitation to the DFG funded conference on conflict in Bad Godesberg. The most enjoyable scholarly year of my life was the subsequent invitation to join Schweizer at Cologne as an Alexander von Humboldt awardee, at Schweizer's nomination. Between cross-cultural, longitudinal, and social networks research, we had a lot in common.

While still at Tübingen, before his reappointment at Cologne as Institute Director, Schweizer's work branched out to include network analysis (1988, 1989), the study of social change (1990) and methods of cognitive anthropology applied to the belief system of a Javanese mystic (1988). His 1989 edited book on *Network Analysis: Ethnological Perspectives* (in German) included his introduction on network analysis as a modern form of structuralism and chapters on network analysis of his Javanese village kinship, economic and religious ties as well as network analysis by microcomputer.

It was through a friend, K.H. Reuband, that Schweizer's attention was drawn to network analysis very early in his undergraduate years, about 20 years before he started publishing in the field himself. Edward Laumann - back then a visiting professor at the University of Cologne - advocated Clyde Mitchell's book on *Social Networks in Urban Situations* as opening a new paradigm to structural analysis. A friend told Thomas Schweizer about the book, which greatly influenced his thinking on anthropology. Cologne sociologists Rene Koenig, Erwin K. Scheuch and Rolf Ziegler, another network researcher, also had a major role in shaping Thomas's understanding of social science, as did his study of psychology.

More or less two decades later network analysis, social change, longitudinal studies, world systems, and discrete structure analysis, as an enrichment of ethnographic analysis, came into focus in his own research. His early work on some of the latter topics included studies on process analysis in ethnology (1989), social change in the previous century in Indonesia (1990), trade networks and state development in the early colonial regimes in Southeast Asia (1991), and radical social change in Communist China (1991).

III. Processual, Structural and Network Analysis: the Directorship years (1990-)

The Cologne Institute of Ethnology built by Johansen and Schweizer functioned as undoubtedly the finest and most cooperative anthropology department it has ever been my pleasure to witness in my 35 year career in anthropology. I made every effort to return each year since 1990 to collaborate with an outstanding group of colleagues and students there. In so doing, I became by some accounts Thomas's next closest professional colleague after Hartmut Lang, a friend of the Schweizer family, host to Nikolaus Schweizer's "semester abroad," and a kind of 'working member' of the Institute.

These years, in spite of the new administrative burdens as a much beloved director of the Cologne Institute, were Thomas's most productive. Not only was he able to continue his studies of Javanese social networks (cited above) and ritual organization (1993), but he was able to open up a number of new initiatives. These included: 1) processual analysis (subject of a 1989 article), 2) the development of network and discrete structure approaches to thinking relationally about fundamental problems in social anthropology, 3) applying networks to cross-cultural analysis as in the conflict project, and 4) reopening issues of anthropological method and epistemology at a still deeper level.

After my first return trip to Cologne after working with Duquenne in France on discrete structure analysis, Schweizer began a series of studies we had envisioned together, applying discrete structure and lattice analysis to the problem of the dual structure of property-ownership. His *Current Anthropology* (1993) and *Indonesia Circle* (1993) articles were among the most successful applications of Galois lattice analysis to problems in social anthropology. He summarized his comparative results in a 1998 article. In 1996 he applied discrete structure analysis to the longitudinal study of structural change – looking at his revolutionary Chinese village data – in the White and Duquenne (1996) volume on Networks and Discrete Structure Analysis.

My own work on large-scale network and kinship analysis comes directly out of the days when, in a series of Cologne and Paris workshops (my sojourns to Paris being also the result of Thomas's sponsorship for me of a Humboldt stipend), Thomas, Hartmut and I would gather with Vincent Duquenne and other social scientists in Paris to apply discrete structure analysis to social science problems. Watching Thomas grapple with a Galois lattice analysis of his Javanese kinship data led to my realization of a simpler way to model the longitudinal and partial-order relationships inherent in kinship structures, via Paul Jorion's formalization of the p-graph. Later, hearing Hartmut describe his demographic simulation programs to a rapt audience of Parisian ethnologists in Michael Houseman's "Kinship and Computing" workshops, it dawned on me how to do permutation tests of kinship structures as Monte Carlo simulations that controlled for demographic constants while varying marriage choices. Many of the ideas born of those days of workshops and collaborative projects have yet to appear in print, but under Thomas's leadership a whole series of high quality contributions flowed out of Cologne that combined ethnographic research with methodology and theoretical innovations. The Humboldt Foundation and NSF jointly supported Thomas and myself from 1993-95 in a Transatlantic Cooperation program that also involved French scholars such as Degenne, Houseman, and Jorion. The 1998 Cambridge press volume on *Kinship, Networks and Exchange* was one of the results, and the initiation of a series of longitudinal cases studies of large-scale social networks for the study of social class, elites, and complex kinship systems was another.

During these years he nominated and won a second A. von Humboldt award for Russ Bernard in 1995-96. What Russ mentions in the preface of his new book reflects the same personal and intellectual hospitality I have experienced. At around the same time Thomas launched a series of new projects. He found that Polly Wiessner (Max Planck Institute, Andechs), who had done Harvard field research on the Dobe !Kung, was willing to share her kinship and economic exchange data for the !Kung. On this project, published in 1996 and 1997 articles, he enlisted Lothar Krempel (Max Planck Institute, Cologne) for his expertise in network visualizing. The results of this project, on !Xharo exchange, was a superb network analysis of an economy embedded entirely within specialized gift-giving exchange relationships.

Schweizer's fluency with conceptual and theoretical issues, combined with flexible and insightful use of a variety of interrelated methodologies, made him a master teacher and researcher. This is reflected in all of his work. Schweizer's depth as a theoretician becomes evident in his chapter on "Epistemology: The Nature and Validation of Anthropological Knowledge," which appeared in Russ Bernard's *Handbook of Method in Cultural Anthropology* (1998). The fieldwork tradition and comparative ethnology have been the unifying threads among the different theoretical and methodological schools in anthropology. How to produce valid descriptions and how to establish comparative theoretical syntheses of these descriptions are among the central epistemological problems. Positivism, hermeneutics and postmodernism/radical constructivism are discussed as major frameworks guiding anthropological research, for which three problems are addressed in terms of focal interrelationships: reality, relativism and truth; empathic *verstehen* and explanation; and theory construction and cumulative knowledge.

The edited volume *Kinship, Networks and Exchange* (Schweizer and White 1998) encapsulates work being done at Cologne and elsewhere which was presented at a conference he organized in 1994. These studies link the study of decision-making and economic exchange (incorporating rational choice and game-theoretical models) with understanding cultural and individual cognitive schemata that operate within network and social structural constraints to motivate, empower and drive social action observed in richly described ethnographic settings.

His textbook on "Patterns of Social Order: Network Analysis as a Foundation for Cultural Anthropology" (*Muster Sozialer Ordnung* 1996) reviews the state of network research against the background of the various structuralisms in social anthropology. Noting the neglect of social structure in recent interpretative and postmodern theories of cultural texts, it shows the usefulness of network analysis for studying the social embeddedness of meanings and emergent social order. The final chapters review network explanations on the relations between action and structure, and introduce graph-theoretic statistical procedures for dissecting social ties.

To enable him to continue that scientific track, Schweizer became the first anthropologist to win the Leibniz Award, which is where my reflections began. With these funds he supported graduate and junior faculty research, built up the computing and library facilities of the institute, and invited a series of scholars to provide additional workshops and courses at the Institute. Russ Bernard and Michael Schnegg taught an intensive course on systematic techniques of data collection and analysis in anthropology. Lilyan Brudner and I provided workshops on longitudinal network research and multimedia ethnography. The more lengthy stays from Russ and myself were accompanied by short term visits from many other network researchers including J. Clyde Mitchell, Lin Freeman, Per Hage, Al Klovdahl, Peter Bearman, and many others.

In partial repayment of the immense generosity shown to us by Thomas and members of the Institute, we hosted a joint project in Costa Mesa – adjacent to the Irvine campus – where 12 Cologne students headed by Thomas as field director carried out a four week intensive field training session in urban network ethnography. The results were published by Schweizer, Schnegg and Berzborn (1998). The project succeeded admirably in the collection of ego-centered network data. The project design of Thomas and the students also included a test of Al Klovdahl's ideas about random-walk networks in urban areas via weak-tie data collection. An on-the-spot reorientation in Irvine towards collecting strong tie social support data undermined that goal, but we learned a great deal about designing urban network research. Thomas had planned to follow up on what we had learned with a further urban network study in Cologne, but that was not to be.

Many social scientists in network studies and anthropology formed lasting ties with faculty and graduates of the Cologne Institute that will continue to produce research influenced by Thomas's vision, support and his many contributions. Joint fieldwork collaborations between UCI and Cologne students in the Costa Mesa studies, for example, led to invitations of several of our students to Cologne where they have formed lasting professional and personal relationships. Conversely, we have invited some of their students and faculty to join our research projects. Thomas's Ph.D. student Michael Schnegg, for example, joined our team doing research on Tlaxcala, Mexico. He is doing a resurvey of our community-level network study of kinship and *compadrazgo*, and we already have several jointly authored analyses of the previously collected data in press.

It is not only his outstanding scientific abilities that made Thomas Schweizer such an extraordinary colleague. Just as important, he created an atmosphere where creativity and cooperation would grow. These ideas and the ties that grew in this atmosphere will live far into the future.

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Building a Network Theory of Social Capital[1]

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INTRODUCTION

In the past two decades, social capital in its various forms and contexts has emerged as one of the most salient concepts in social sciences. While much excitement has been generated, divergent views, perspectives, and expectations have also raised the serious question: is it a fad or does it have enduring qualities that will herald a new intellectual enterprise? This presentation's purpose is to review social capital as discussed in the literature, identify controversies and debates, consider some critical issues, and propose conceptual and research strategies in building a theory. I will argue that such a theory and the research enterprise must be based on the fundamental understanding that social capital is captured from embedded resources in social networks. Deviations from this understanding in conceptualization and measurement lead to confusion in analyzing causal mechanisms in the macro- and micro-processes. It is precisely these mechanisms and processes, essential for an interactive theory about structure and action, to which social capital promises to make contributions.

The paper will begin by exploring the nature of capital and various theories of capital, so that social capital can be properly perceived and located. It will then identify certain controversies which, unless clarified or resolved, will hinder the development of a theory and the research enterprise. By considering social capital as assets in networks, the paper will discuss some issues in conceptualizations, measurements, and causal mechanisms (the factors leading to inequality of social capital and the returns following investments in social capital). A proposed model will follow. The paper will conclude by calling attention to the rise of a new form of social capital, cybernetworks, and briefly suggesting how research on this topic promises to make important contributions to the research enterprise.

WHAT IS CAPITAL?

The notion of capital can be traced to Marx (1933/1849; 1995/1867, 1885, 1894; Brewer, 1984). In his conceptualization, capital is part of the surplus value captured by capitalists or the bourgeoisie, who control production means, in the circulations of commodities and monies between the production and consumption processes. In these circulations, laborers are paid for their labor (commodity) with a wage allowing them to purchase commodities (such as food,

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shelter, and clothing) to sustain their lives (exchange value). But the commodity processed and produced by the capitalists can be circulated to and sold in the consumption market at a higher price (user value). In this scheme of the capitalist society, capital represents two related but distinct elements. On the one hand, it is part of the *surplus value* generated and pocketed by the capitalists (and their "misers," presumably the traders and sellers). On the other hand, it represents an *investment* (in the production and circulation of commodities) on the part of the capitalists, with expected returns in a marketplace. Capital, as part of the surplus value, is a product of a process; whereas capital is also an investment process in which the surplus value is produced and captured. It is also understood that the investment and its produced surplus value are in reference to a return/reproduction of the process of investment and of more surplus values. It is the dominant class that makes the investment and captures the surplus value. Thus, it is a theory based on the exploitative social relations between two classes. I call Marx's theory of capital the *classical theory of capital*.

Subsequent theoretical modifications and refinements have retained the basic elements of capital in the classical theory, as represented in Table 1. Fundamentally, capital remains a surplus value and represents an investment with expected returns. Human capital theory (Johnson, 1960; Schultz, 1961; Becker, 1964/1993), for example, also conceives capital as investment (e.g., in education) with certain expected returns (earnings). Individual workers invest in technical skills and knowledge so that they can negotiate with those in control of the production process (firms and their agents) for payment of their labor-skill. This payment has value that may be more than what the purchase of subsisting commodities would require and, thus, contain surplus values which in part can be spent for leisure and lifestyle needs and in part turned into capital. Likewise, cultural capital, as described by Bourdieu (Bourdieu, 1990; Bourdieu & Passeron, 1977), represents investments on the part of the dominant class in reproducing a set of symbols and meanings, which are misrecognized and internalized by the dominated class as their own. The investment, in this theory, is in the pedagogic actions of the reproduction process, such as education, the purpose of which is to indoctrinate the masses to internalize the values of these symbols and meanings. Cultural capital theory also acknowledges that the masses (the dominated class) can invest and acquire these symbols and meanings, even if they misrecognize them as their own. The inference is that while cultural capital is mostly captured by the dominant class through inter-generation transmissions, even the masses (or at least some of them) may generate returns from such investment and acquisition.

However, these theories break significantly from the classical theory. That is, because the laborers, workers or masses can now invest, and thus acquire certain capital of their own (be they skills and knowledge in the case of human capital, or "misrecognized" but nevertheless internalized symbols and meanings), they (or some of them) can now generate surplus values in trading their labor or work in the production and consumption markets. The social relations between classes (capitalists and non-capitalists) become blurred. The image of the social structure is modified from one of dichotomized antagonistic struggle to one of layered or stratified negotiating discourses. I call these the *neo-capitalist theories*. The distinctive feature of these theories resides in the potential investment and capture of surplus value by the laborers or masses. Social capital, I argue, is another form of the neo-capital theories.[2]

Table 1. Theories of Capital

	The Classical Theory	The Neo-Capital Theories			
		Human Capital	Cultural Capital	Social Capital	
Theorist	Marx	Schultz, Becker	Bourdieu	Lin, Burt, Marsden, Flap, Coleman	Bourdieu, Coleman, Putnam
Explanation	Social relations: Exploitation by the capitalists (bourgeoise) of the proletariat	Accumulation of surplus value by laborer	Reproduction of dominant symbols and meanings (values)	Access to and use of resources embedded in social networks	Solidarity and reproduction of group
Capital	A. Part of surplus value between the use value (in consumption market) and the exchange value (in production-labor market) of the commodity. B. Investment in the production and circulation of commodities	Investment in technical skills and knowledge	Internalization or misrecognition of dominant values	Investment in social networks	Investment in mutual recognition and acknowledgment
Level of Analysis	Structural (classes)	Individual	Individual/class	Individual	Group/ individual

WHY DOES SOCIAL CAPITAL WORK?

The premise behind the notion of social capital is rather simple and straightforward: *investment in social relations with expected returns.* This general definition is consistent with various

[2] There is some ambiguity in Bourdieu's writings as to whether cultural capital should be seen as a structural theory or a theory which allows choice actions. He (Bourdieu, 1990; Bourdieu & Passeron, 1977) defines culture as a system of symbolism and meaning (Jenkins 1992, p. 104). The dominant class in the society imposes its culture by engaging in pedagogic action (e.g., education), which internalizes the dominant symbols and meanings in the next generation, thus reproducing the salience of the dominant culture. The result is an internalized and durable training, *habitus*, in the reproduction of the culture. The mass is not cognitively aware of the imposition and takes on the imposed culture as their own – misrecognition. This rendition of capital can trace its lineage to Marx. The social relations described by Marx are also assumed; there is a class, capitalists, who control the means of production – the process of pedagogic action or the educational institutions (in the homes, in schools, etc.). In the production (schooling) process, laborers (students or children) invest in the educational process and internalize the dominant class culture. Acquisition of this culture permits or licenses the laborers to enter the labor market, earn payments and sustain expenditures for their lives. The capitalists, or the dominant class, gain cultural capital which supplement their economic capital and accumulate capital of both types in the circulation of the commodities (educated mass) and the domination of the means of production (the educational institutions). However, there is a break from Marx and an important one. Bourdieu does not assume perfect correspondence between the accumulation of economic capital and cultural capital. Some economic capitalists do not possess cultural capital and some cultural capitalists are not economically endowed. This less than perfect correspondence would seem to open the possible path for some of the laborers, using their cultural habitus, to gain a foothold in the dominant class. It is conceivable that they become part of the educational institutions and gain returns in the labor market, due to their cultural capital. Bourdieu did not carry his analysis this far, but seems to leave open the process of social mobility and the possibility of agency.

renditions by all scholars who have contributed to the discussion (Bourdieu, 1983/1986; Bourdieu, 1980; Burt, 1992; Coleman, 1988; Coleman, 1990; Erickson, 1995; Erickson, 1996; Flap, 1994; Flap, 1991; Lin, 1982; Lin, 1995; Portes, 1998; Putnam, 1993; Putnam, 1995a). Individuals engage in interactions and networking in order to produce profits. Generally, three explanations can be offered as to why embedded resources in social networks will enhance the outcomes of actions. For one, it facilitates the flow of *information*. In the usual imperfect market situations, social ties located in certain strategic locations and/or hierarchical positions (and thus better informed on market needs and demands) can provide an individual with useful information about opportunities and choices otherwise not available. Likewise, these ties (or their ties) may alert an organization (be it in the production or consumption market) and its agents, or even a community, about the availability and interest of an otherwise unrecognized individual. Such information would reduce the transaction cost for the organization to recruit "better" (be it skill, or technical or cultural knowledge) individuals and for individuals to find "better" organizations which can use their capital and provide appropriate rewards. Second, these social ties may exert *influence* on the agents (e.g., recruiters or supervisors of the organizations) who play a critical role in decisions (e.g., hiring or promotion) involving the actor. Some social ties, due to their strategic locations (e.g., structural holes) and positions (e.g., authority or supervisory capacities), also carry more valued resources and exercise greater power (e.g., greater asymmetry in dependence by these agents), in organizational agents' decision-making. Thus, "putting in a word" carries a certain weight in the decision-making process regarding an individual. Third, social tie resources, and their acknowledged relationships to the individual, may be conceived by the organization or its agents as certifications of the individual's *social credentials*, some of which reflect the individual's accessibility to resources through social networks and relations -- his/her social capital. "Standing behind" the individual by these ties reassures the organization (and its agents) that the individual can provide "added" resources beyond the individual's personal capital, some of which may be useful to the organization. Finally, social relations are expected to reinforce identity and recognition. Being assured and recognized of one's worthiness as an individual and a member of a social group sharing similar interests and resources not only provides emotional support but also public acknowledgment of one's claim to certain resources. These *reinforcements* are essential for the maintenance of mental health and the entitlement to resources. These four elements -- *information, influence, social credentials and reinforcement* -- may explain why social capital works in instrumental and expressive actions not accounted for by forms of personal capital such as economic capital or human capital.[3]

PERSPECTIVES AND CONTROVERSIES IN SOCIAL CAPITAL

However, two perspectives can be identified relative to the level at which return or profit is conceived -- whether the profit is accrued for the group or for the individuals. In one perspective, the focus is on the use of social capital by individuals – how individuals access and use resources embedded in social networks to gain returns in instrumental actions (e.g., finding

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[3] Another element, control, has also been mentioned for the usefulness of social capital. I consider control reflecting both the network location and the hierarchical position, central to the definition of social capital itself. Thus, information, influence, social credential, and reinforcement are all reasons why social capital works or controls.

better jobs) or preserve gains in expressive actions. Thus, at this relational level, social capital can be seen as similar to human capital in that it is assumed that such investments can be made by individuals with expected return, some benefit or profit, to the individual. Aggregation of individual returns also benefits the collective. Nonetheless, the focal points for analysis in this perspective are (1) how individuals invest in social relations, and (2) how individuals capture the embedded resources in the relations to generate a return. Representative works (see review in Lin, 1999) can be found in Lin (Lin & Bian, 1991; Lin & Dumin, 1986; Lin, Ensel & Vaughn, 1981), Burt (1992;1998;1997), Marsden (Marsden & Hurlbert, 1988; Campbell, Marsden & Hurlbert, 1986), Flap (Boxman, De Graaf & Flap, 1991; De Graaf & Flap, 1988; Flap & De Graaf, 1988; Flap, 1991; Sprengers, Tazelaar & Flap, 1988; Volker & Flap, 1996), and Portes (Portes & Sensenbrenner, 1993) as well as in discussions of social capital by Coleman and Bourdieu.

Another perspective has its focus on social capital at the group level, with discussions dwelling on (1) how certain groups develop and maintain more or less social capital as a collective asset, and (2) how such a collective asset enhances group members' life chances. Bourdieu (1983/1986; 1980) and Coleman (1988; 1990) have discussed this perspective extensively and Putnam's empirical work (1993; 1995a) is exemplary. While acknowledging the essentiality of individuals interacting and networking in developing payoffs of social capital, the central interest of this perspective is to explore the elements and processes in the production and maintenance of the collective asset. For example, dense or closed networks are seen as the means by which collective capital can be maintained and reproduction of the group can be achieved. Another major interest is how norms and trust, as well as other properties (e.g., sanctions, authority) of a group, are essential in the production and maintenance of the collective asset.

Whether social capital is seen from the societal-group level or the relational level, all scholars remain committed to the view that it is the interacting members who make the maintenance and reproduction of this social asset possible. This consensual view puts social capital firmly in the neo-capital theory camp.[4]

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[4] Two major and different theoretical positions distinguish scholars in the collective asset camp. For Bourdieu, social capital represents a process by which individuals in the dominating class, by mutual recognition and acknowledgment, reinforce and reproduce a privileged group which holds various capital (economic, cultural and symbolic). Nobility and titles characterize such groups and their members. Thus, social capital is another way of maintaining and reproducing the dominant class. I would characterize this theoretical position as one that views social capital as class (privilege) goods. The other position on social capital as collective asset is represented by the works of Coleman and Putnam. Coleman, while defining social capital as consisting of any social-structural features or resources that are useful to individuals for specific actions, stresses social capital as public good. These collective assets and features are available to all members of the group, be it a social group or community and regardless of which members actually promote, sustain or contribute to such resources. Because social capital is public good, it depends on the good will of the individual members to make such efforts and not to be free riders. Thus, norms, trust, sanctions, authority and other structural "features" become important in sustaining social capital. If one were forced to trace the theoretical lineage of these two explanatory schemes, one could argue that the privileged good view is principally an extension and elaboration of the social relations in the Marxian capital theory and that the public good view is primarily an extension and elaboration of the integrative or Durkheimian view of social relations.

However, the divergence in analyzing social capital at different levels has created some theoretical and measurement confusions. Further confusion arises from the fact that some discussions have flowed freely between levels. For example, Bourdieu provides a structural view in pointing to the dominant class and nobility groups' reproduction as the principal explanation of social capital, which is represented by aggregating (1) the size of the group or network and (2) the volume of capital possessed by members (Bourdieu 1986, p. 248). This representation makes sense only when it is assumed that all members maintain strong and reciprocal relations (a completely dense or institutionalized network), so that strength of relations does not enter into the calculus. Yet, Bourdieu also describes how individuals interact and reinforce mutual recognition and acknowledgment as members of a network or group. Coleman (1990 Chapter 12), while emphasizing how individuals can use socio-structural resources in obtaining better outcomes in their (individual) actions, devotes much discussion to the collective nature of social capital in stressing trust, norms, sanctions, authority, and closure as part or forms of social capital. It is important to identify and sort through these confusions and reach some understandings before we can proceed to build a coherent theory of social capital. I identify some of these issues in Table 2.

Table 2. Controversies in Social Capital

Issue	Contention	Problem
Collective or individual asset (Coleman, Putnam)	Social capital as collective asset	Confounding with norms, trust
Closure or open networks (Bourdieu, Coleman, Putnam)	Group should be closed or dense	Vision of class society and absence of mobility
Functional (Coleman)	Social capital is indicated by its effect in particular action	Tautology (cause is determined by effect)
Measurement (Coleman)	Not quantifiable	Heuristic, not falsifiable

One major controversy generated from macro- versus relational-level perspectives is whether social capital is collective goods or individual goods (see Portes' critique, 1998). Most scholars agree that it is both collective and individual goods; that is, institutionalized social relations with embedded resources are expected to be beneficial to both the collective and the individuals in the collective. At the group level, social capital represents some aggregation of valued resources (such as economic, political, cultural, or social, as in social connections) of members interactive as a network or networks. The difficulty arises when social capital is discussed as collective or even public goods, along with trust, norms, and other "collective" or public goods. What has resulted in the literature is that the terms have become alternative or substitutable terms or measurements. Divorced from its roots in individual interactions and networking, social capital becomes merely another trendy term to employ or deploy in the broad context of improving or building social integration and solidarity. In the following, I will argue that social capital, as a relational asset, must be distinguished from collective assets and goods such as culture, norms, trust, etc. Causal propositions may be formulated (e.g., that collective assets, such as trust, promote the relations and networks and enhances the utility of embedded resources, or vice versa), but it should not be assumed that they are all alternative forms of social capital or are defined by one another (e.g., trust is capital).

Another controversy, related to the focus on the collective aspect of social capital, is the assumed or expected requirement that there is closure or density in social relations and social networks (Bourdieu 1986; Coleman 1990; Putnam 1993, 1995). Bourdieu, from his class perspective, sees social capital as the investment of the members in the dominant class (as a group or network) engaging in mutual recognition and acknowledgment so as to maintain and reproduce group solidarity and preserve the group's dominant position. Membership in the group is based on a clear demarcation (e.g., nobility, title, family) excluding outsiders. Closure of the group and density within the group are required. Coleman, of course, does not assume such a class vision of society. Yet, he also sees network closure as a distinctive advantage of social capital, because it is closure that maintains and enhances trust, norms, authority, sanctions, etc. These solidifying forces may ensure that it is possible to mobilize network resources.

I believe that the requirement for network density or closure for the utility of social capital is not necessary or realistic. Research in social networks has stressed the importance of bridges in networks (Granovetter, 1973; Burt, 1992) in facilitating information and influence flows. To argue that closure or density is a requirement for social capital is to deny the significance of bridges, structural holes, or weaker ties. The root of preferring a dense or closed network lies, rather, in certain outcomes of interest (Lin, 1992a; Lin, 1986; Lin, 1990). For *preserving or maintaining resources* (i.e., expressive actions), denser networks may have a relative advantage. Thus, for the privileged class, it would be better to have a closed network so that the resources can be preserved and reproduced (e.g., Bourdieu 1986); or for a mother to move to a cohesive community so that her children's security and safety can be assured (Coleman 1990). On the other hand, for *searching and obtaining resources* not presently possessed (i.e., instrumental actions), such as looking for a job or better job (e.g., Lin; Marsden; Flap; Burt), accessing and extending bridges in the network should be more useful. Rather than making the assertion that closed or open networks are required, it would be theoretically more viable to (1) conceptualize for what outcomes and under what conditions a denser or more sparse network might generate a better return, and (2) postulate deduced hypotheses (e.g., a denser network would be more likely to promote the sharing of resources which, in turn, maintain group or individual resources; or, an open network would be more likely to access advantaged positions and resources, which in turn enhance the opportunity to obtain additional resources) for empirical examination.

A third controversy that requires clarification is Coleman's statement that social capital is any "social-structural resource" that generates returns for an individual in a specific action. He remarks that "social capital is defined by its function" and "it is not a single entity, but a variety of different entities having two characteristics: They all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure" (1990, p. 302). This "functional" view may implicate a tautology: social capital is identified when and if it works; the potential causal explanation of social capital can only be captured by its effect, or whether it is an investment depends on the return for a specific individual in a specific action. Thus, the cause factor is defined by the effect factor. Clearly, it would be impossible to build a theory where causal and effectual factors are folded into a singular function. This is not to deny that a functional relationship may be hypothesized (e.g., resources embedded in social networks enhance obtaining better jobs). But the two concepts must be treated as separate entities with independent measurements (e.g., social capital is the investment in social relations and better jobs are represented by occupational status or supervisory position). It would be incorrect to allow the outcome variables to dictate the specification of the causal variable (e.g., for actor X, kin ties are social capital because these ties channel X to get a better job, and for actor Y, kin ties are not social capital because these ties do not channel Y to get a better job). The hypothesized causal relationship may be conditioned by other factors (e.g., family characteristics may affect differential opportunities for building human and social capital) which need be specified in a more elaborate theory. A theory would lose parsimony quickly if the conditional factors become part of the definitions of the primary concepts. In fact, one would question whether it remains a theory if it is required to make a good prediction for every individual case and individual situation.

Perhaps related to this view of social capital as indistinguishable from its outcome -- and perhaps given his view that social capital, as collective good, can also be seen in many different forms such as trust, norms, sanctions, authority, etc. -- Coleman questions "whether social capital will come to be as useful a quantitative concept in social science as are the concepts of financial capital, physical capital, and human capital remains to be seen; its current value lies primarily in its usefulness for qualitative analyses of social systems and for those quantitative analyses that employ qualitative indicators" (1990, pp. 304-305). Again, the confusion can be seen as resulting from extending the notion of social capital beyond its theoretical roots in social relations and social networks and the unattainable theoretical position that prediction holds for every individual case. Once these issues are resolved, social capital should and must be measurable.

CONCEPTUALIZING AND MEASURING SOCIAL CAPITAL

These debates and clarifications lead to the suggestion that social capital, as a concept, is rooted in social networks and social relations, and must be measured relative to its root. Therefore, social capital can be defined as *resources embedded in a social structure which are accessed and/or mobilized in purposive actions*. By this definition, the notion of social capital contains three ingredients: resources embedded in a social structure; accessibility to such social resources by individuals; and use or mobilization of such social resources by individuals in purposive actions. Thus conceived, social capital contains three elements intersecting structure and action: the structural (embeddedness), opportunity (accessibility) and action-oriented (use) aspects.

These elements have been mentioned by most scholars working on social capital. The social resources theory (Lin 1982) has specifically proposed that access to and use of social resources (resources embedded in social networks) can lead to better socioeconomic statuses. Further, the theory proposes that access to and use of social resources are in part determined by positions in the hierarchical structure (the strength of position proposition) and by the use of weaker ties (the strength of tie proposition). Bourdieu defines the volume of social capital as a function of the size of the network and the volume of capital (economic, cultural and symbolic) possessed by networked individuals. Burt (1992) postulates that certain network positions (structural holes and structural constraints) have effects on individuals getting better positions or rewards in organizations. Flap (1995) defines social capital as a combination of network size, the relationship strength, and the resources possessed by those in the network. Portes (1998) also advocates focusing on social relations and networks in the analysis of social capital.

Embedded Resources and Network Locations

Given the significance of resources and relations in social capital, it is not surprising that scholarly research has shown differential focus on one of the two elements. Some have chosen to focus on the locations of individuals in a network as the key to social capital. Burt's work (1990) typifies this approach. By identifying the locations of individual nodes, it is possible to assess how close or how far the node is from a strategic location, such as a bridge, where the occupant has the competitive advantage in possible access to more, diverse, and valued information. Strength of ties (Granovetter 1973, 1974) is also a well-known conceptually argued network location measurement of a bridge's usefulness. Other location measures are readily available in the literature, such as density, size, closeness, betweenness, and eigenvector (see review of such location measures in Borgatti, Jones and Everett (1998)). Implicit or explicit in this approach is the argument that network location is the key element of identifying social capital.

Another approach focuses on the embedded resources. In social resource theory, valued resources in most societies are represented by wealth, power and status (Lin 1982). Thus, social capital is analyzed by the amount or variety of such characteristics of others with whom an individual has direct or indirect ties. Measurement of social resources can be further specified as network resources and contact resources. Network resources refer to resources embedded in one's ego-networks, whereas contact resources refer to resources embedded in contacts used as helpers in an instrumental action, such as job searches. Thus, network resources represent accessible resources and contact resources represent mobilized resources in instrumental actions. For contact resources, the measurement is straightforward – the contact's wealth, power and/or status characteristics, typically reflected in the contact's occupation, authority position, industrial sector, or income.

There is little dispute that embedded resources are valid measures for social capital. There is some debate as to whether network locations are measures of social capital or precursors to social capital. My own view is that if it is assumed that social capital attempts to capture valued resources in social relations, network locations should facilitate, but not necessarily determine, access to better embedded resources. What types of network locations evoke resources in order to generate returns depend on the type of returns one expects. In the Modeling Section below, I will argue that two types of outcomes are possible as returns to social capital: instrumental and expressive. In instrumental actions, the return is the gaining of added resources, resources not presently possessed by ego — whereas in expressive actions, the return is the maintaining of possessed resources. For example, if we assume that bridges link to different information, the utility of that information depends on whether it concerns resources valued by the individual but not yet attained. If it does not, then the bridge serves little utility. If it does, the bridge is very useful. That is, not all bridges (or network locations) lead to better information, influence, social credentials or reinforcement. A bridge linking an individual looking for a job in a corporation to people occupying influential positions in large corporations will likely be of significantly more utility to that individual than from a bridge that leads to others who are members of a health club. On the other hand, a mother with young children would prefer to live in a dense, cohesive community rather than one with a mobile population and open access to the external world. Likewise, a person facing personal stresses such as divorce might benefit from access to and interaction with others who have had similar stress and understand its psychological effects, rather than someone who is happily married. These are expressive actions and we should expect the benefit of a dense network and homogenous partners.

These considerations would suggest that network locations should be treated as exogenous variables rather than endogenous variables of social capital itself. I will return to this topic in the Modeling section (pg. 39). Suffice it to conclude here that social capital is more than mere social relations and networks; it evokes the resources embedded and accessed. Nevertheless, such embedded resources cannot possibly be captured without identifying network characteristics and relations. Network locations are necessary conditions of embedded resources. In a given study, it is advisable to incorporate measures for both network locations and embedded resources.

Measuring Social Capital as Assets in Networks

Paralleling these two conceptual elements of social capital have been two principal approaches in measuring social capital as assets captured by individuals in social networks, as depicted in Table 3.

Table 3. Social Capital as Assets in Networks

Focus	Measurements	Indicators
Embedded resources	Network resources	Range of resources, best resources, variety of resources, composition (average resources), contact resources
	Contact statuses	Contacts' occupation, authority, sector
Network locations	Bridge to access to bridge	Structural hole, structural constraint
	Strength of tie	Network bridge, or intimacy, intensity, interaction & reciprocity

The first approach is to measure embedded resources. In this approach, resources embedded in the social networks are seen as social capital's core element. Thus, measurements focus on the valued resources (e.g., wealth, power, and status) of others accessed by individuals in their networks and ties. Such measurements can be made relative to two frameworks: (1) network resources and (2) contact resources. Network resources tap resources represented in the network an individual has access to. Typically, they include (1) the range of resources among ties (or the "distance" between the highest and lowest valued resources), (2) the best possible resources in the networks or among ties (or upper "reachability" in the resource hierarchy), (3) variety or heterogeneity of resources in the networks, and (4) composition of resources (average or typical resources). Research evidence is that these measures are highly correlated and tend to form a single factor, with the highest loading usually on the range of upper-reachability measures. Contact resources indicate the valued resources represented by contacts or helpers in specific actions. These measures, usually the valued resources (wealth, power, and status) of the contact(s), are applied in the context of specific actions, such as job searches. There is consistent and strong evidence that both network resources and contact resources positively affect the outcome of instrumental actions, such as job search and job advances (Lin 1999).

Another prevailing measurement strategy focuses on network locations as measurements of social capital. A major perspective is the argument that bridges or access to bridges facilitates returns in actions. Granovetter's notion of bridges as expressed in the strength of weak ties (1973) was a preview of this argument, which is elaborated and formalized by Burt in his notions of structural holes and constraints (1992). Other measures of bridges (e.g., betweenness) would also be candidates for social capital, even though they are used less in the social capital context.

There are many other measures such as size, density, cohesion, and closeness of social networks which are candidates as measures for social capital. However, research evidence is much less clear as to their viability in a social capital theory. Unless clear theoretical arguments are presented along with the use of any specific measures, as both measures of social resources and network locations have been, it would be ill-advised to simply use any network measure as an indicator of social capital.

Sampling Techniques

Three sampling techniques have been employed to construct measures of social capital, as can be seen in Table 4. The saturation sampling technique is useful when it is possible to map a definable social network. In such networks, data from all nodes are gathered and their relationships identified, and measurements of network locations can be developed. The advantage of this technique is that it allows detailed and complete analyses of each and every network location as well as embedded resources in each node. Because of the requirement that the network has a defined and manageable boundary, it is a technique most useful for studies of social capital within an organization or a small network among organizations.

Table 4. Measurement Techniques

Technique	Advantages	Disadvantages
Saturation survey	Complete mapping of network	Limited to small networks
Name generator	Customized content areas Ego-centered network mapping	Lack of sampling frame Biased toward strong ties
Position generator	Content-free Sampling of hierarchical positions Multiple "resources" mapped Direct and indirect accesses	Lack of specificity of relations

For larger and less definable networks, ego-network sampling techniques are used. Typically, the name-generator technique (Laumann, 1966; Wellman, 1979; McCallister & Fischer, 1978; Burt, 1984; Marsden, 1987) is employed. This measurement technique elicits a list of ties from ego, and the relationships between them as well as among them are identified. From these data, locations of ego as well as these ties, relative to one another, can be computed. Network resources can also be obtained from the name-generator technique. Measures such as composition (typical resource characteristics), heterogeneity (diversity of resources), and upper reachability (best possible resources) can be computed. The advantages of this approach include (1) the identification of specific content areas, relative to actions under investigations, as naming items, and (2) the mapping of ego-network locations and characteristics as well as social resources embedded in the ego-network. The disadvantages include: (1) the lack of frames for sampling naming items, and (2) bias toward the inclusion of stronger ties.

The position-generator technique, a more recently developed technique (Lin and Dumin 1986), samples positions in a given hierarchy representative of resources valued in the collective (e.g., occupational status or prestige, authority positions, sectors, etc.). In this technique, a sample of positions with identified valued resources (occupational statuses, authority positions, industrial sectors, etc.) is used and the respondent is asked to indicate if she/he knows anyone having that job or position. From the responses, it then becomes possible to construct network resource indexes such as composition, heterogeneity, and upper reachability.

This technique has several advantages: (1) it can be based on a representative sample of positions meaningful in a given society, (2) it can directly or indirectly identify linkages to such resource positions, and (3) it can be based on multiple resource criteria (e.g., occupation, authority, and industry). Studies in North America (Erickson, 1996), as well as Europe (e.g., Flap and Boxman in the Netherlands; Boxman, De Graaf & Flap, 1991; Volker and Flap in East Germany;Volker and Flap 1996; Argelusz and Tardos in Hungary; Angelusz & Tardos, 1991; Tardos, 1996) and Asia (e.g., Lin, Hsung and Fu in Taiwan; (Lin, Fu & Hsung, 1998) have proven the utility of this theoretically derived methodology in the context of social capital and instrumental action. It seems particularly useful if the valued resources are considered the core element of social capital. A sample of the position-generator instrument is presented in Table 5.

Table 5. Position Generator for Measuring Accessed Social Capital: An Example

Here is a list of jobs (show card). Would you please tell me if you happen to know someone (on a first-name basis) having each job?								
Job	1. Do you know anyone having this job?*	2. How long have you known this person? (# of years)	3. What is your relationship with this person?	4. How close are you with this person?	5. His/her gender.	6. His/her job.	7. Do you think you may find such a person through someone you know? (Person M)	8. Repeat #2-6 for Person M
Job A								
Job B								
Job C								
etc.								

*If you know more than one person, think of the one person whom you have known the longest (or the person who comes to mind first)

MODELING SOCIAL CAPITAL

To explicitly operationalize the critical elements, we may sharpen the definition of social capital as *investment in social relations by individuals through which they gain access to embedded resources to enhance expected returns of instrumental or expressive actions*. From this, three processes can be identified for modeling: (1) investment in social capital, (2) access to and mobilization of social capital, and (3) returns of social capital. While the above discussion clarifies social capital's definition, elements, and measurements, it is necessary to discuss briefly the types of outcomes which can be considered as expected returns. I propose two major types of outcomes: (1) returns to instrumental action, and (2) return to expressive action (Lin 1992a; Lin 1986; Lin 1990). Instrumental action is taken to obtain resources not possessed by the actor, whereas expressive action is taken to maintain resources already possessed by the actor.

For instrumental action, we may identify three possible returns: economic return, political return, and social return. Each return can be seen as added capital. Economic return is straightforward. Political return is similarly straightforward, represented by hierarchical positions in a collective. Social gain needs some clarification. I have argued that reputation is an indication of social gain. Reputation can be defined as favorable/unfavorable opinions about an individual in a social network. A critical issue in social exchange where social capital is transacted is that the transaction may be asymmetric: a favor is given by the alter to ego. The ego's action is facilitated, but what is the gain for the alter, the giver of the favor? Unlike economic exchange, where reciprocal and symmetric transactions are expected in the short or long term, social exchange may not entail such expectation. What is expected is that the ego and the alter both acknowledge the asymmetric transactions which create the former's social debt to the latter, who accrued social credit. Social debt must be publicly acknowledged in public for the ego to maintain his/her relationship with the alter. Public recognition in the network spreads the reputation of the alter. The greater the debt, the larger the network, and the stronger the need for the ego and the alter to maintain the relationship, the greater the propensity to spread the word in the network and, thus, the greater the reputation gained by the alter. In this process, the alter is gratified by the reputation, which, along with material resources (such as wealth) and hierarchical positions (such as power) constitutes one of the three returns fundamental in instrumental actions. I have discussed this issue elsewhere (Lin, 1998).

For expressive action, social capital is a means to consolidate resources and to defend against possible resource losses (Lin, 1986; Lin, 1990). The principle is to access and mobilize others who share interest and control of similar resources so that embedded resources can be pooled and shared in order to preserve and protect existing resources. In this process, alters are willing to share their resources with ego because the preservation of the ego and its resources enhances and reinforces the legitimacy of alters' claim to like resources. Three types of return may be specified: physical health, mental health, and life satisfaction. Physical health involves maintenance of physical functional competence and freedom from diseases and injuries. Mental health reflects capability to withstand stresses and maintenance of cognitive and emotional balance. Life satisfaction indicates optimism and satisfaction with various life domains such as family, marriage, work, and community and neighborhood environments.

Oftentimes, returns to instrumental actions and expressive actions reinforce each other. Physical health offers the capacity to handle the enduring work load and responsibility needed to attain economic, political, and social statuses. Likewise, economic, political or social statuses often offer resources to maintain physical health (exercises, diet, and health maintenance). Mental health and life satisfaction are likewise expected to have reciprocal effects with economic, political and social gains. However, factors leading to the instrumental and expressive returns are expected to show differential patterns. As mentioned earlier, it may well be that open networks and relations are more likely to enable access to and use of bridges to reach to resources lacking in one's social circle and to enhance one's chances of gaining resources/instrumental returns. On the other hand, a denser network with more intimate and reciprocal relations among members may increase the likelihood of mobilizing others with shared interests and resources to defend and protect existing resources/expressive returns.

Further, exogenous factors such as community and institutional arrangements and prescriptive versus competitive incentives may differentially contribute to the density and openness of networks and relations and the success of instrumental or expressive actions.

Having discussed the core elements of social capital, clarified some of the measurement and sampling issues, identified the types of returns, and briefly postulated differential patterns of causal effects, I would like to propose a model as an initial step of theorizing social capital. As can be seen in Figure 1, the model contains three blocks of variables in causal sequences (see bottom of figure). One block represents pre-conditions and precursors of social capital: the factors in the social structure and each individual's position in the social structure which facilitate or constrain the investment of social capital. Another block represents social capital elements, and a third block represents possible returns for social capital.

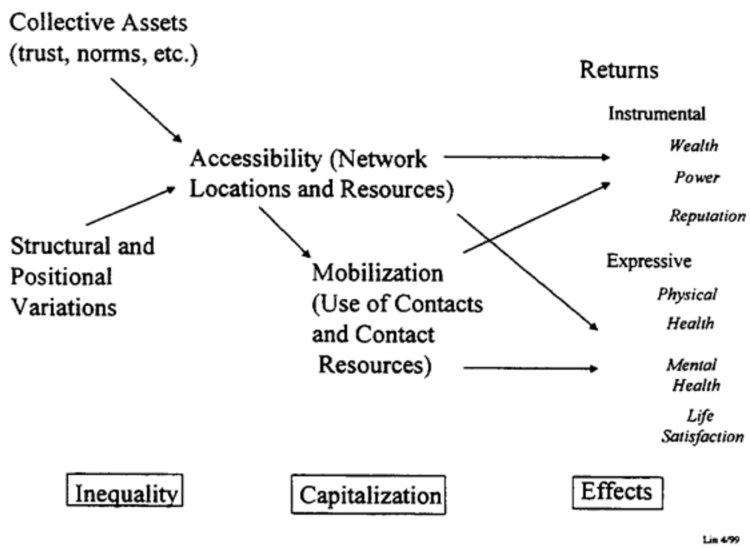

Figure 1. Modeling a Theory of Social Capital.

The process leading from the first block to the second block describes the formation of inequality of social capital: what structural elements and positional elements in the structure affect opportunities to construct and maintain social capital. It delineates patterns of differential distributions for social resources that are embedded, accessed, or mobilized. It should further demonstrate that there are social forces that determine such differential distributions. Thus, it is incumbent on a theory of social capital to delineate the patterns and determinants of the three ingredients of social capital or *the inequality of social capital* as collective assets, accessible social resources, and mobilized social resources. Two types of causation forces are of special interest to scholars in the analysis of inequality of social capital: structural and positional variations. A structure may be characterized in many variations, such as diversity in culture and ideology, level of industrialization and technology, level of education, extent of physical and natural resources, economic productivity, etc. Within a structure, individuals may be described as occupying different positions in social, cultural, political, and economic strata. These variations may be hypothesized to affect the richness or poorness of various social ingredients.

Within the second block, there is a process linking two elements of social capital: access to social capital and use of social capital. The process linking the two elements represents the process of social capital mobilization. That is: given the unequal distributions of social capital how would an individual be enabled or disabled to mobilize such capital for specific actions? This is where the model, while recognizing structural contributions to social capital, as captured in the inequality process, also emphasizes possible choice action in mobilization.

Third, the theory needs to demonstrate that the three ingredients are inter-connected. Thus, it needs to propose a causal sequence in which embedded resources constrain and enable individual choices and actions. The general expectation is that the better the accessible embedded resources, the better embedded resources can and will be mobilized in purposive actions by an individual. The more intriguing question is why given the same level of accessible embedded resources, some individuals mobilize better resources than others in actions. One contingency may be the network location. One could hypothesize that being a bridge or being closer to a bridge might make a difference: those at or near these locations are better able to mobilize embedded resources. Also, the cognitive recognition that there is a structural advantage of using better embedded resources may make a difference.

Finally, the process linking the second block (social capital) and the third block (outcomes) represents the process where social capital produces returns or yields. Here, the theory should demonstrate how social capital is capital, or how it generates return or gain. That is, it should propose how one or more of the elements of social capital directly or indirectly impact an individual's economic, political and social capital (resources) or her/his physical, mental and life well-beings.

These conceptualizations, as individual components and processes, are not new. Research on the social resources theory (Lin 1999) has verified the proposition that social resources or social capital enhances an individual's attained statuses such as occupational status, authority, and placement in certain industries. Through these attained positions, social capital enhances economic earnings as well. These relationships hold up after family background and education are taken into account. Burt (1997, 1998) and others (Podolny & Baron, 1997) have shown that advances and economic rewards are also enhanced in organizations for individuals at strategic locations in the informal networks. For those closer to structural holes or bridges, and, thus, less structural constraints, they seem to gain better returns, presumably because such locations give these individuals better opportunities to access certain capital in the organization. Research is progressing on how organizations use social capital in recruiting and retaining individuals. Fernandez and associates (Fernandez & Weinberg, 1997) have shown that referrals increase applications, recruit better qualified candidates, and reduce costs in the screening process.

In Putnam's studies (1993; 1995a; 1995b), this is indicated by participation in civic associations (e.g., churches, PTAs, Red Cross) and social groups (bowling leagues). Coleman (1990) provides examples of diffusion of information and mobilization through social circles among radical Korean students (i.e., network as capital), a mother moving from Detroit to Jerusalem in order to have her child walk to playground or school safely (norm as capital); and diamond traders in New York making trades through informal ties and informal agreements (network and trust as capital). Portes (1998) also specified "consummatory" and instrumental consequences of social capital (see Portes and Sensenbrenner 1993 for the consummatory consequences -- solidarity and reciprocal support -- of social capital for immigrant groups). The primary focus here is on the development, maintenance, or decline of collective assets.

At the meso-network level, the focus is shifted to how individuals have differential access to resources embedded in the collective. The question posed is, in a given collective, why certain individuals have better access to embedded resources than others. The nature of social networks and social ties becomes the focus of analysis. Granovetter (1973; 1974; 1982; 1985; 1995) proposes that bridges, as usually reflected in weaker ties, provide better access to information. Burt (1992; 1997; 1998) sees that strategic locations in the networks, structural holes or structural constraints, imply better or worse access to information, influence, or control. Lin (1982; 1990; 1994a; 1995; 1999) has suggested that hierarchical positions as well as network locations facilitate or hinder access to embedded resources. Embedded resources are indicated by the wealth, status, and power of social ties.

At the micro-action level, social capital is reflected in the actual linkage between the use of embedded resources in instrumental actions. For example, there is substantial literature on how informal sources and their resources (contact resources) are mobilized in job searches and their effects on attained socioeconomic statuses (Lin, Ensel & Vaughn, 1981; De Graaf & Flap, 1988; Marsden & Hurlbert, 1988).

Research has also been extensive in the area of expressive actions' returns. Much is known about the indirect effects of networks on mental health and life satisfaction (Lin 1986; House, et al. 1988; Berkman & Syme 1979; Berkman 1984; Hall & Wellman 1985; Wellman 1981; Kadushin 1983). That is, network locations enhance the likelihood of accessing social support which, in turn, improves one's physical or mental well-being.

CYBERNETWORKS: THE RISE OF SOCIAL CAPITAL

The final section will be devoted to a discussion of the phenomenon I call cybernetworks, defined as social networks in cyberspace. In 1997, U.S. consumers bought more computers than automobiles, according to Steven Landefeld, director of the Bureau of Economic Analysis (USA Today, March 17, 1999). Worldwide PC sales will overtake television sales in 2000, according to Paul Otellini of the Intel Architecture Business Group (Intel Developer Forum, February 25, 1999). In fact, PC sales already outnumbered sales of TV sets in 1998 in Australia, Canada, Denmark, and Korea. In 1999, 50 percent of U.S. households will have computers and 33 percent will be online (Bob Metcalfe, Info World, January 18, 1999, p. 90, quoting International Data Corp.)

E-commerce has become big business. In 1998 online shopping registered at $13 billion (with an average order amount of $55) and it is projected to reach $30 to $40 billion in 1999 (the Boston Consulting Group, as quoted in PC Magazine March 9, 1999, p. 9). Greatest growth is expected in travel (88% in 1999 over 1998), PC hardware (46%), books (75%), groceries (137%), music (108%), and videos (109%) (Jupiter Communication, as quoted in PC Magazine, March 9, 1999, p. 10). It has been estimated that 24 million U.S. adults plan to buy gifts online in 1999, or almost quadruple the 7.8 million who said they bought gifts online in 1998; online holiday shopping alone in 1999 could exceed $13 billion (International Communications Research, as quoted in PC Week, March 1, 1999, p. 6). During 1999, Internet commerce, which is growing 30 times faster than most world economies, will reach $68 billion (Bob Metcalfe, Info World, January 18, 1999, p. 90, quoting International Data Corp.). By year 2002, the projection is that online shopping will account for $32 billion for convenience items such as books and flowers, $56 billion for researched purchases like travel and computers, and $19 billion for replenishment goods such as groceries (Forrester Research Inc., as quoted in PC Week, January 4, 1999, p. 25). Another projection suggests that 40 percent of Web users will be online buyers by 2002, resulting in $400 billion of e-commerce transactions (International Data Corporation, as quoted in ZDNet Radar, Jesse Berst, "Technology of Tomorrow", January 6, 1999). In the first half of 1998, one out of every five retail stock trades occurred online. There are now an estimated 4.3 million people shopping for stocks and funds online, and online trading is expected to reach 31 percent of the total U.S. investment market by 2003 (Piper Jaffray, March 1999 PC Computing? P. 14).

On March 16, 1999, the US Commerce Department scrapped a 60-year-old industry classification system which had little relevance to an information-based economy (USA Today, March 17, 1999). For example, computers were not even an industry category; they were grouped with adding machines. Thus, a new system was installed which better reflected categories brought about by the information revolution. The system is also designed to be similar to those in Mexico and Canada as trade with those countries continues to grow (USA Today, March 17, 1999). Further, the US Commerce Department will begin publishing figures that show the impact of online shopping on retail activity, a key indicator of the nation's economic health. Until now the Department has lumped online shopping figures together with catalogue sales in its overall retail sales numbers. New figures that break out Internet sales as a separate entity will be available by the middle of 2000 for 1998 and 1999 (Info World, February 15, 1999, p. 71).

The growth of the Internet in the past few years has been nothing short of phenomenal. In 1995, 14.1 million of 32 million U.S. households had modems and in January 1999, 37.7 million of 50 million U.S. households had modems (USA Today, March 17, 1999, p. 9D). Worldwide, there were 68.7 million web users in 1997, 97.3 million in 1998, and the projection is that the number of web users will grow at a compound annual growth rate of 26 percent, reaching 227 million by 2001 (IDC, as quoted in PC Magazine, February 9, 1999, p. 10). During 1999, the number of Internet users will surge by 28 percent to 147 million. Two-thirds of the people who will be online by 2002 are not online in early 1999 (Bob Metcalfe, Info World, January 18, 1999, p. 90, quoting International Data Corp.). At the end of 1997, only about 4,000 hotel rooms around the world offered Internet access, but the prediction is that by 2002 about four million hotel rooms in the United States alone will be online (Jupiter Communications, quoted in PC Computing, February, 1999, p. 14). Currently, over 90 percent of hotel Internet users used the accesses for e-mail, 60 percent for Web surfing, 50 percent for directions and maps, and close to 40 percent for faxing. Although business travelers are most likely to take advantage of this service, about 32 percent of these hotel guests surf the Web for entertainment purposes.

More than 45 million PC's in the US accessed the Internet regularly in early 1998, a 43 percent increase in the first quarter of 1998 versus the first quarter of 1997. Nearly 49 percent of all U.S. households had at least one personal computer (ZD Market Intelligence, January, 1999). This year, for the first time, most users -- 51 percent- - will live outside the United States ((Bob Metcalfe, Info World, January 18, 1999, p. 90, quoting International Data Corp.) The number of Internet users in China surged to 1.5 million in 1998, from 600,000 in 1997 (Xinhua News Agency, January 15, 1999). U.S. Internet guru Nicholas Negroponte predicted in January 1999 that the number of Internet users in China will balloon to 10 million by the year 2000 (Reuters, January 15, 1999).

Female participation on the net has increased dramatically. In January 1996, only 18 percent of net users aged 18+ were females; by January 1999, fully 50 percent of the users were females (USA Today, March 17, 1999, p. 9D). By the end of the year, it is expected that women will become the majority of users on the Internet (Bob Metcalfe, Info World, January 18, 1999, p. 90, quoting International Data Corp.). In 1997, more e-mail was sent than letters via the post office for the first time.

Personal computer experts have announced, without surprise to anyone, that the Internet is changing everything. Michael J. Miller, Editor-in-chief of PC Magazine wrote in February 1999 (PC Magazine, February 2, 1999, p. 4) that the Internet changes "the ways we communicate, get information, entertain ourselves, and run our businesses." In January 1999, Paul Somerson stated the same in PC Computing. It is practically impossible to get a credible estimate of how many discussion groups, forums, and clubs of multitude types have been formed and are continually being formed. What is the implication of cyberspace and cyber-network growth for the studies of social networks and social capital? The short answer is: incredible.

Take two important theoretical debates: the decline of social capital and the class-domination of globalization. The decline of social capital, a thesis based on enormous empirical work conducted by Putnam and others (Putnam, 1995a; Putnam, 1995b) is that social capital has been in the decline in the United States for the past three to four decades. As mentioned earlier, Putnam defined social capital, at least in the context of democratic societies, as civic engagements, or social relations that sustain and promote voluntary associations and groups. By examining many time-series data sets to trace the patterns of participation in relationally based associations and groups such as bowling leagues and PTAs, he concluded that for the past thirty to forty years, social capital has been on the decline in the United States.

There are a number of conceptual (tautological) and measurement (what associations are relational) flaws one can find in this research program. In view of the dramatic growth of cyber-networks, a fundamental question can be raised: do cyber-networks carry social capital? If so, there is strong evidence that the declining thesis is false. I suggest that indeed we are witnessing *a revolutionary rise of social capital*, as represented by cyber-networks. In fact, we are witnessing a new era where social capital will soon supercede personal capital in significance and effect.

Just as pertinent is the debate on whether globalization represents a reproduction of the world system where the core states continue to dominate and indeed "colonize" peripheral states by the incorporation of the latter into global economic systems dominated by the former (Sassen & Appiah, 1998; Browne & Fishwick, 1998; Brecher & Costello, 1998). This argument is supported by evidence that international organizations, international corporations, and international economic forms, such as commodity chains, are dominated by the values, culture, and authority of dominant states' corporations or these states themselves. Yet, cyber-networks suggest the possibility of a bottom-up globalization process where entrepreneurships and group formations become viable without the dominance of any class of actors (Wellman, 1998). Do cyber-networks suggest a neo-globalization process? I argue that, while not denying that the dominant states and actors remain actively interested in controlling the development of cyberspace, cyber-networks represent a new era of democratic and entrepreneur networks and relations where resources flow and are shared by a large number of participants with new rules and practices, many of which are devoid of colonial intent or capability.

With the increasing availability of inexpensive computers and ever-increasing web capabilities which transcend space and time, we are facing a new era of social networks in the form of global villages. Globalization is no longer necessarily a reproduction of the core-peripheral world system where the core states establish links and networks to the peripheral states for their continuing domination of information, resources, and surplus values. Instead, information is freer and more available to more individuals than ever before in human history. While access to computers and Internet remains distributed unequally and under varying dictatorial control, it is nevertheless clear that such constraints and control are waning fast as inexpensive computers and access to the Internet become available and at minimal cost, and technology leapfrogs the traditional authoritarian control of access to information and resources. There is strong evidence that an increasing number of individuals are engaged in this new form of social networks and social relations, and there is little doubt that a significant part of the activities involve the creation and use of social capital. Access to free sources of information, data, and other individuals create social capital at unprecedented pace and ever-extending networks. Networks are expansive and yet at the same time "intimate." Networking transcends time (connecting whenever one can and wants to) and space (accessing to sites around the globe directly or indirectly if direct access is denied). Rules and practices are being formulated as such networks are being built and constructed. Institutions -- borrowed from past practices, deliberately deviating from past practices, or consensually arrived at by participants -- are being created as such networks (e.g., villages) are being built.

There is little doubt that the hypothesis that social capital is declining can be refuted if one goes beyond the traditional interpersonal networks and analyzes the cyber-networks as they have emerged in the 1990s. Indeed, we are witnessing the beginning of a new era where social capital far outpaces personal capital in significance and effect. We need to compile basic data and information on the extent to which individuals are spending time and effort engaging others over cyber-networks, as compared to the use of time and effort for interpersonal communications, other leisure activities (TV watching, travel, eating out, movie- and theater-going), attending civic and local meetings, etc. We need to estimate the amount of useful information gathered through cyber-networks as compared to traditional media.

What kind of research agenda should we consider in view of the emerging cyber-networks in the coming millennium? I propose the following topics:

(1) Emergence and development of cybernetworks and villages: the formation and development of social groups and social organizations (the villages). We need data on cyber-networks as global villages - how each village is being constructed and rules and practices routinized, especially (a) how each group and territory is defined or undefined (closure versus openness), (b). how membership is claimed, defined, or acknowledged (ie.., residents and citizens); (c). how the members are composed (e.g., demographics: individuals, households, and clusters; age, gender, ethnicity, linguistics, socioeconomic assets); and (d) how resources are distributed within a village and across villages: class and inequality among villages.

(2) Organizations and patterns of networking: the development and implementation of networking and network locations. For example, it would be useful to study: (a) patterns of interactions and exchanges, (b) size, density, and heterogeneity of participants, and (c) network locations of various actors and their resources (see next topic).

(3) Socio-economic characteristics of participants: the potential social capital. It would be necessary to explore what resources the various actors bring to bear. These resources, including social relations and networks, would possibly account for (a) unequal opportunities to network locations, and (b) unequal access to embedded resources in each village.

(4) Globalization and localization: the formation and development of linkages across villages as social capital is extended beyond each group-village. These linkages further explore whether classes of villages are being formed. These structural and dynamic elements of networks further expand differential access to social capital. Important issues also include whether and how villages can develop and maintain domination-subordination relations and exchanges and what mechanisms would account for the functioning or not functioning of such relations (e.g., gender, age, ethnicity, and linguistic imperialism, technical skills and requirement, etc.) , and the consequences of these relations on relative accessibility to social capital.

(5) War and peace in the global village - or competition and coordination among villages. Inevitably there will be tensions, conflicts, violence, competition, and coordination issues among villages. How do villages claim "self-defense" or "self-interest" and invade other villages for resources? How do villages become imperial or colonial powers? How do villages defend themselves and form coalitions? Would a "united nations" emerge and under what rules and practices? Would such a global body be dominated by the core villages? Thus, cyber-networks serve as vehicles to examine society as it emerges in real time. They are also analyzed as couter-evidence to the proclaimed demise or decline of the global village and social capital.

(6) Technology, commerce, and the global village. With the increasing development of technology and the ever-presence of commercial interests, cyber-networks fuse socio-economic-technological elements in social relations and social capital. This new feature of mixed economic and social capital poses new questions regarding the access and use of social capital. As technology has already made it possible to actualize the "virtual" reality (e.g., audio-visual, 3-D, touch-sensitive) and to transcend time and space (wireless and inexpensive equipment, for example) such that love, passion, as well as hatred and murder are being "real-ized" and personalized — for example, Internet romances and murders have occurred (Washington Post, March 6, 1999, p. A2); decency and free speech are clashing (Time, February 15, 1999, p. 52); personal data and history are becoming increasingly public (USA Today, January 18, 1999, p. 3B); Yugoslav sites used e-mails to engage "cyberwar" during the Kosovo conflict (Wall Street Journal, April 8, 1999). Is it possible that cyber-networks might break the dominance of elite classes and differential utility in social capital? Yet, technology requires resources and skills. While the globalization process is underway, there might be a trend for cyber-networks to exclude many under-developed societies and disadvantaged members of many societies. Thus, would these developments further unequalize the distribution of social capital? And under what conditions? Would these developments further segregate the world into the haves and the have-nots? Analyses must evaluate these questions relative to the different aspects of social capital (information, influence, social credentials, and reinforcement) and different outcomes (instrumental and expressive).

I suspect that the entire spectrum of the development and utility of all forms of capital can be examined on cyber-networks, which fundamentally is relations and embedded resources — a form of social capital. In short, then, much work is urgently needed to understand how cyber-networks build and segment social capital. The above-mentioned topics will provide some of the data for scholars to understand new institutions and cultures as they emerge and the interactions between human and social capital. Most importantly, I suggest that they will provide clues as to whether and how social capital may be outpacing personal capital in significance and effect, and civil society, instead of dying, may be becoming expansive and global.

CONCLUDING REMARKS

Social networks scholarship has much to say and to do about the development and future of social capital. Without anchoring the concept in social networks and embedded resources, chances are that social capital would fade away as an intellectual enterprise for the ever -broadening and -confounding definitions and almost utopian expectations of its practical applications. With ever sharpening definitions and measurements, social network scholarship may have much to contribute to the sustained development of social capital as an intellectual enterprise. As cyber-networks emerge as a major source of social capital, a new era is dawning and providing opportunities as well as challenges for theoretical development and practical analysis -- an era exciting and yet daunting for social networks scholars everywhere.

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Toward Computer-Assisted Qualitative Network Analysis[1]

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In this article we outline computer-assisted qualitative network analysis (CAQNA) by introducing a prototype of RELNET, a program developed during our own research project. We conclude by suggesting future directions for CAQNA software development.

INTRODUCTION

Current interest and advances in research on social networks owes a lot to the development of sophisticated computer tools for the analysis of network structure. Today it is common practice to analyze social networks in terms of subgroups or positions with the help of specialized software such as UCINET, NEGOPY and STRUCTURE.[2]

However, most of these programs are based on algorithms which try to distill the essence of networks to quantitative parameters.[3] As useful as this software is, we argue that the network analysis tools could be developed further. In fact, for many students of social networks the available data consist not only of nodes and links and their properties but a wealth of other types of information. In the case of personal networks this data may include more or less structured interviews, biographies and personal diaries.

In the current analysis programs a researcher working with such data quickly runs into trouble since the existing software tends to isolate network structure from the context and content of other kinds of available data. This is also one of the warnings issued by Michael Eve (1998) in his critical overview of the structural network analysis tradition. While acknowledging the undeniable merits of structural network analysis, Eve suggests greater sensitivity to biographical data as well as to anomalous and alternative network patterns which tend to be rejected in the standard analysis techniques – to mention only a few of Eve's points. (Eve 1998, see also Gribaudi 1998).

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[1]Our research on social networks stems from a larger comparative project originated and coordinated by professor Maurizio Gribaudi, Ecole des Hautes Etudes en Sciences Sociales, Paris. The Finnish research group was headed by professor Risto Alapuro, Department of Sociology, University of Helsinki. For the findings of the international project, see Espaces, Temporalités, Stratifications. Exercises Méthodologiques sur le Réseau, 1998.

[2] For an overview of the network analysis software, see the INSNA homepage: http://www.heinz.cmu.edu/project/INSNA/.

[3]More recently much work has been done on visualisation of networks.

To take an example of our own ongoing research: we not only have data matrixes of Russian and Finnish teachers' personal networks; we also have data on their daily interactions as recorded in the structured diaries and theme interviews concerning their life course as well as a structured questionnaire on their family relations and political activities.[4] When working with traditional network analysis programs we are able to calculate indices on network structure – valuable information as such – but unable to combine this information with other data sources. However, we find ourselves constantly in a situation where interpreting the differences in, say, network density requires a simultaneous analysis of diaries and life stories as will be shown in the next section.

QUALITATIVE VS. QUANTITATIVE ANALYSIS

Though much of the research on networks Eve considers relevant has been done in an ethnographic manner, he does not directly relate his criticism to the qualitative-quantitative dichotomy. Neither is it our intention to resume the somewhat futile and unresolved debate between 'quantitative' and 'qualitative' analysis, which has a long history in the social sciences (see e.g. Handbook of Qualitative Research, 1994). The opposition has been formulated in different ways usually in the form of dichotomies such as interpretive–explanatory, subjective –objective, inductive–deductive or even soft–hard. Most of these dichotomies — the one between soft and hard data for example — are easy to deconstruct. Nevertheless, a good working definition is offered by Norman Denzin and Yvonna Lincoln:

> The word *qualitative* implies an emphasis on processes and meanings that are not rigorously examined, or measured (if measured at all), in terms of quantity, amount, intensity, or frequency. Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry. Such researchers emphasize the value-laden nature of inquiry. They seek answers to questions that stress how social experience is created and given meaning. In contrast, quantitative studies emphasize the measurement and analysis of causal relationship between variables, not processes. Inquiry is purported to be within a value-free framework. (Denzin and Lincoln, 1994, 4).

Despite the somewhat exaggerated formulation of the following ideal typical example, there are indeed some important differences in working methods between ethnographically oriented researcher A intensively analyzing 40 personal networks and researcher B analyzing network data obtained through surveys in order to discover differences between, say, women's and men's networks. While the latter may arrive at more generalizable results, the former may be more interested in the subjective meanings the individual women and men attach to their social

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[4] The whole data corpus consists of the structured daily diaries kept by 40 St. Petersburg and 38 Helsinki teachers during two weeks in 1993. These diaries concerning the encounters and the network members (alters), as well as background information concerning the respondents (egos) were stored in a relational database program. The thematic interviews on respondents' life course were stored as word-processor files and the interconnections between the network members as reported by the respondents were stored as binary matrix files. Despite the modest number of respondents, our data contains information on roughly 3000 daily interactions and 2000 network members in Helsinki and St. Petersburg in 1993. The study was replicated in St. Petersburg with 20 teachers and 5 psychologists in 1996. For more information on the substance and findings of the project, see Lonkila 1997, 1998a, 1998b.

relations and to the different logic implied in their networks.[5] According to researcher A, the same network density, for instance, may refer to dissimilar life strategies when analyzed in the context of individual respondents' biographies. In addition, the significance of the density index itself should be interpreted in the light of all other information available on the respondents (see Gribaudi 1998).

Thus, high density in the personal network of a Russian village girl who recently migrated to St. Petersburg may indicate different mechanisms of sociability from those in the network of an elderly lady, a native of St. Petersburg and a former party member. While the network density of the former may suggest to a sociability trying to reproduce a rural 'village style' life in the city, the latter may reveal administrative and party connections following a completely different logic.[6]

These two ideal typical analysis types certainly hint at more profound methodological and theoretical questions than it is possible to address here. These questions, as shown by Gribaudi and Eve, are related not only to the qualitative/quantitative distinction (that is, the method chosen) but also to the scope of analysis, the level of data aggregation, etc. Moreover, the tide seems to be flowing towards the integration of both schools of analysis either in terms of combining different styles of data and analysis in the same study or sequencing qualitative and quantitative phases of research.

Our intention in this article is therefore simply to present actual problems of network analysis which emerged directly out of our current research on personal networks, rather than to plunge into the murky waters of the methodological or theoretical discussion. 'Qualitative analysis' is a satisfactory shorthand for our own way of working. We leave it to our readers to decide whether it corresponds to their own experiences and working habits.

COMPUTER-AIDED QUALITATIVE NETWORK ANALYSIS (CAQNA)

These topics have been discussed intensively in the literature on computer-assisted qualitative data analysis (Richards & Richards 1994, Computer-aided Qualitative Data Analysis 1995; see also Weitzman and Miles 1995, Fisher 1997). As in our study, this branch of software first emerged out of the researchers' own need to manage the complexity of free-form textual data and the abundant interconnections among, say, the opinions expressed in thematic interviews. While the first generation of this software carried out quite simple tasks (most often tagging the texts with keywords and retrieving their boolean combinations - see Tesch 1990), qualitative

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[5] Needless to say, neither way of working is by definition preferable but depends on the research problem.

[6] The obvious counterargument is that this problem is only due to the modest sample – had the researcher had more data, s/he could analyze village habitants and city dwellers separately. MULTINET, for instance, allows for using background variables in the analysis of data on network structure (see http://www.sfu.ca/~richards/multinet.htm). This counter-argument, however, presupposes significant resources to collect such data. Even having collected them, we would need qualitative interviews to gain in-depth understanding of the different logic of 'village' and 'status-based' sociability.

data analysts now increasingly rely on highly specialized programs such as ATLAS.ti or NUD·IST when analyzing their data.

Current CAQNA software

Some attempts to combine network concepts and qualitative analysis have been carried out, and corresponding tools have been developed. In their book on qualitative computing Weitzman and Miles (1995) mention such software as Inspiration, MECA (see Carley 1993), Metadesign and SemNet. While each one has useful features (e.g. for brainstorming and building semantic networks) none is optimal for the type of analysis we are contemplating.

Of the 'proper' qualitative analysis software, ATLAS.ti comes closest to our needs and notions of a qualitative network analysis tool (Figure 1).[7] Though the following example of ATLAS.ti applies to conceptual analysis, there is nothing in the program structure to prevent its use in the analysis of personal social networks.

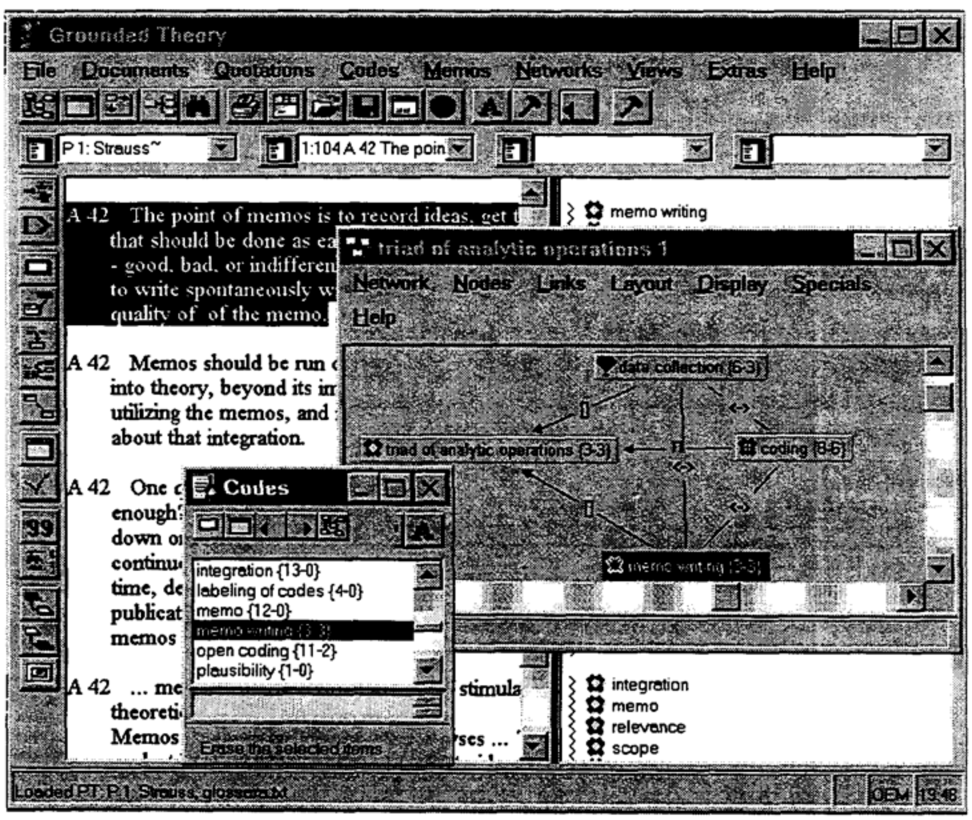

Figure 1. The screen of ATLAS.ti.

Figure 1 shows ATLAS.ti's ready-made demo describing the Grounded Theory research analysis process. The column at the left shows the text on Grounded Theory which has been

[7] For a more detailed description of ATLAS.ti see: http://www.atlasti.de

coded by several keywords shown in the separate smaller 'Codes' window. The connections among these codes have been defined by the user as shown in the graphical network editor by selecting among ready-made links (the user may also define the links at will). It is argued that the researcher may develop his/her theory (i.e. conceptual map) out of the evolving network of codes.[8] During each phase of the analysis the researcher may interactively switch back and forth between the network editor and the coded interview data to check the consistency of her thoughts, write memos concerning interesting findings, and so on.

Applied to our study on personal networks, this kind of software would help us to understand the logic behind the specific configuration of social relations revolving around a particular individual. Though effective in the field of qualitative data analysis, ATLAS.ti does, however, lack some features which make it difficult to apply to social network analysis. First, it lacks the most basic features for calculating network structure indices. Second, it does not accept networks in matrix form. The current version of ATLAS.ti, however, includes some useful features for qualitative network analyst, such as reordering the nodes by degree and neighbor selection. According to the developer, Thomas Muhr, the next version of ATLAS.ti will include several interfaces to the common network analysis programs (Muhr 1999).

RELNET: A prototype for computer-assisted qualitative network analysis

The built-in exploratory logic of ATLAS.ti clearly differs from structural network analysis programs, in which the properties of a network or its nodes can be presented in numbers. Nevertheless, such simple but important questions about a respondent's personal network such as 'What kind of people has Vera come to know through work? Do they know Vera's family and friends?' can only be answered with difficulty with traditional programs. These simple questions are thoroughly theoretical by nature (in our own research denoting such things as the differing public/private distinction between Russia and Finland). By placing them at the level of individuals rather than groups, the researcher may remain sensitive both to the variability among the respondents' life strategies as well as to the 'anomalous' cases easily neglected in mainstream analysis.

In order to present this kind of qualitative network analysis in a concrete fashion, we will describe some features of RELNET, a prototype of a qualitative network analysis program.[9] The goal of its development was quite simply to obtain a tool for the kind of analysis we were interested in and could not find elsewhere. The point of introducing it here is that it nicely exemplifies both our style of analysis and our demands on the analysis software.

The opening screen of RELNET (Figure 2) shows the personal network of one of our Finnish respondents. The self-reported interconnections among her network members have been stored

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[8] For the connections between Grounded Theory method and computer-assisted qualitative research software see Lonkila 1995, Lonkila 1993.

[9] RELNET was developed by Timo Harmo in the course of our own ongoing research.

in a binary matrix. The network graph has been drawn on the basis of this matrix with the help of RESEAU, software programmed by Andrei Mogutov.[10]

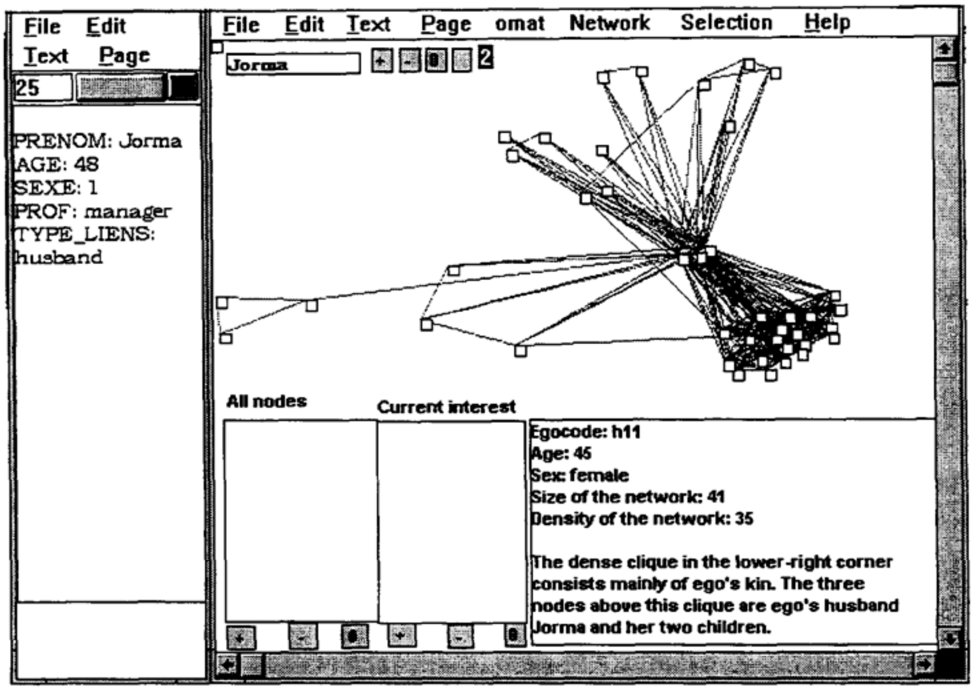

Figure 2. The RELNET screen

Figure 2 shows the division of the RELNET screen into five parts, the network graph occupying the largest. The column on the left of the network graph shows the data concerning the network node we are currently interested in. The column in the lower right hand corner contains our working notes related both to this particular person as well as to her network.[11] The meaning of the two empty columns below the graph will be explained later.

'What are the three central nodes located in the middle of the graph?'

To begin with, we may simply look at the form of the network graph and pose this kind of exploratory question. This simple question may, however, be surprisingly hard to answer if the network matrix has been stored separately and no links exist between the matrix and other kinds of data. To answer this question with the help of RELNET, we have first selected those database fields we are currently interested in from a pull-up menu.[12] We have then clicked the rightmost of the three central nodes with the mouse, which shows information concerning this particular

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[10] RELNET also reads output from UCINET's multidimensional scaling.

[11] For readers' convenience, the Finnish data in the figures have been translated into English.

[12] For each encounter/person met, our respondents recorded a wealth of different information in their daily diaries. The resulting database contains 17 fields with both numerical and textual data (e.g. date and place of the encounter; age, sex and profession of the person encountered, etc.).

network member in the column on the left-hand side of the network graph. We thus learn that this is the respondent's 48 year-old husband, Jorma, who is a manager by profession. Having done this, we can then do the same for the two other unexplained nodes, which shows that these two nodes are the respondent's sons.

'Which of the network members does the respondent's husband know?'

If we are interested not only in the properties, say, of the person represented by node A, but in the properties of the other network members known by this person (the first-order star of A), we can first select the property (e.g. occupation) from the menu and then double-click node A. In Figure 3, we have first selected the property 'occupation' and then double-clicked the respondent's husband, with the following results. First, RELNET has enlarged the sizes of both the husband's node and his first-order star to make them stand out visually in the graph. Second, all the occupations of the husband's first-order star have been listed in the middle column below the network graph (sorry, the occupations are in Finnish only). In addition, we have asked RELNET to paint all the nodes representing the network members with different colours or shades of colour in proportion to their emotional closeness to the respondent.[13] (On a real-life computer screen, a purple node would denote the respondent's closest connections, a pink node the next closest, and so on down to the 'cold' blue nodes. Since the colours cannot be shown here, for the purposes of this article one might think of the darkest nodes as the respondent's strong ties and the lighter ones as weak ties.)

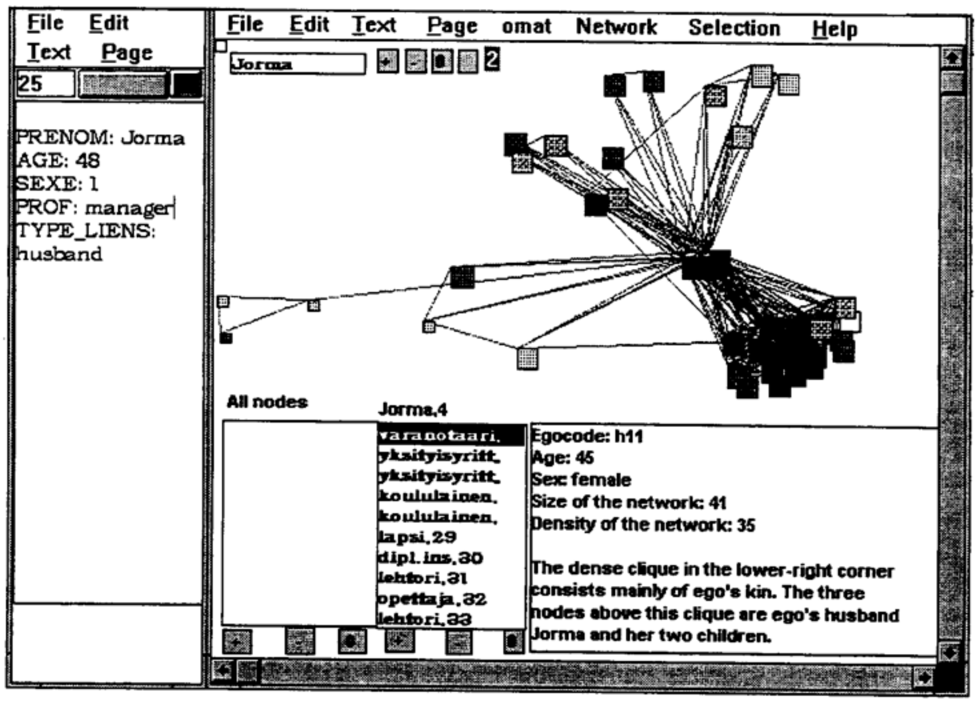

Figure 3. RELNET: information about the respondent's husband's connections

[13] RELNET retrieves all information concerning network members in the database. In this case the respondent was asked to rank the emotional closeness between herself and each network member on a scale from 1 (very close) to 7 (not at all close).

If we would like to inquire further into some particular profession listed among the husband's connections (such as 'varanotaari' – Associate in Laws in Figure 3), we could select it from the list in the middle column by a mouse click. This operation would have two consequences (not shown in Figure 3). First, the node referring to this person in the graph would blink briefly. Second, the column on the left would show the information stored in the database concerning this person. In the Finnish data, for instance, clicking 'farmer' often reveals that the farmer in question is the respondent's relative, denoting the agrarian roots and social mobility of Finnish teachers.

If we were interested in exploring the properties of network members known by the husband's first-order star we could double-click the husband's node once again to obtain information about his second order star (and in like fashion the third-order star, etc.). If we'd like to browse the occupation (or some other property) of *all* network members, we could ask RELNET to list them in the left-hand column underneath the network graph.

'How long has the respondent known her network members? What is the nature of her oldest connections?'

As is already obvious, simple boolean searches are available in the program. In Figure 3, RELNET shows a combination of emotional closeness and the husband's first order star. In a similar way RELNET may search for those nodes representing people who have been known by the respondent for more than 20 years. The nodes satisfying this condition will be enlarged in the graph and the properties inquired about (the occupation could be changed, e.g., to the 'type of relation between the respondent and her network member') will be shown in the middle column. This search may then be combined with an additional search based, for instance, on the sex of the network members to make those women known for more than 20 years stand out from the graph.

In a like manner, RELNET can also search for free-form text in the database. Thus we may search for those network members for which the database field 'type of relation' contains the word 'friend'. The results will be similar to those described in the previous example.

CONCLUSIONS

In this article our intention has not been to advertise RELNET as an ideal tool for the qualitatively inclined network analyst.[14] Instead, we have presented RELNET in order to exemplify the kind of analytic tasks we are struggling with in our own research. RELNET carries out apparently simple, almost trivial tasks compared with the sophisticated number-crunching implemented by traditional network analysis programs. We argue, however, that these simple operations may assist us in exploring and understanding the underlying logics of our respondents' social life.

Even as a prototype, RELNET lacks many essential features. First, an obvious weakness is its inability to link *unstructured* textual data (such as coded interviews containing information on

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[14] The more so, because we lack resources to develop the program into finished software.

network members) with the network graph.[15] Second, it does not have links with existing software to calculate measures of network structure (reading UCINET's multidimensonal scaling output being the only exception). Third, it cannot deal with information defining or describing the links. Rather than a finished product, RELNET should be seen as a first step towards software development which is currently largely neglected.

These observations lead us to conclude by offering some features of an 'ideal' CAQNA program. In our view, such a software should allow the researcher:

1. to manage and combine different kinds of textual and numerical data with the data and indices on network structure (including an interface with currently existing structural network analysis software).

2. to stay close to his/her data by switching interactively between the network structure and other kinds of data.

3. to freely define the nature of links and nodes both qualitatively (naming or describing) and quantitatively (assigning numerical values)

4. to carry out constant queries in the database or other available data about the nature of nodes.

5. to assist in semi-intelligent reordering of the networks

In the near future we see four different directions of software development to address these needs. First, interfaces could be developed between the existing qualitative and social network analysis programs via common file formats. Second, qualitative analysis software could incorporate some of the methods of social network analysis. Third, current network analysis programs could incorporate ideas from qualitative analysis. Finally, specialized CAQNA software could be developed.

Given the effort and resources needed in the last two directions we feel that the most effective development work could be done with the building of interfaces between the two types of programs. This work could proceed simultaneously with the incorporation of the structural network analysis methods in qualitative analysis software, such as ATLAS.ti.

We leave it to the reader to decide whether the style of analysis and research problems we have presented above reflect their own needs. Our aim has been simply to open up the discussion of the correspondence between the network analysis types and the available software. We believe that a larger variety of analytic tools would greatly benefit the network analysis community. It would do so not only by responding to a larger variety of research needs in the field, but also by enlarging the audience for research on social networks.

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[15] The current version works only on structured databases

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Social Capital Research Literature: Analysis of Keyword Content Structure and the Comparative Contribution of Author Names[1]

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LASMAS-IdL

In previously published work on the analysis of sociological AIDS research literature from 1980 to 1990, based on entries in Sociological Abstracts, I have shown that the evolution of research themes, of authors, and of journals in this domain are quite distinct from each other. Indeed, they each form a separate set of longitudinal network data generated by the same data base. Here, I perform a similar cognitive mapping analysis using all entries in Sociological Abstracts containing the keyword "social capital" and find an overall structure of themes but little coherence and few clear divisions. These results are confirmed by a more traditional cross-tabulation of key words, author names and scientific journal titles. I describe the three largest thematic groups -- education, economy and family, respectively -- but not the largest -- "social" -- thematic group which is vast and lacks coherence.

INTRODUCTION

On the late 1995 edition of the *Sociological Abstracts* CD-ROM, I searched for all entries with the term or keyword "social capital" and retrieved 87. The term social capital appears nowhere as a "Descriptor" (DE) term -- meaning it is not in the *Sociological Abstract* thesaurus -- but it does occur in the abstracts, in the titles and in what is called the "Indexing Phrase" (IP). In several cases, such as the example below, the exact term does not figure at all in the entry, but the subject is clearly social capital and was retrieved by the CD-ROM search for "social capital".

> Cultural Transmission: Family Strategies and Social Position (La Transmission Culturelle: Strategie Des Familles et Position Sociale), Lienard,-georges; Servais,-emile (U Louvain, Belgium; Cahiers-internationaux-de-sociologie; 1975, 59, Jul-dec, 337-353; Cultural Transmission Is Accomplished by Everyday Practices Determined by the Structures in Which There Are Educational Agents. These Structures Originate from the Habits of Sc's. Families Within a Social Class Pass On, Intergenerationally, the Cultural Capital They Possess, & Do So in a Habitual Way. To Examine the Principles Which Constitute These Habits & Strategies Which Families of Different Sc's Employ to Achieve Social Positions, 80 Families with at Least

[1]This article is a version of a paper presented at the 28-31 May 1998 Sunbelt Social Network Conference in Sitges, Spain, in the section, "Social Capital and Its Measurement", organized by Alain Degenne and the European Social Capital Project. The Project encouraged the creation of a Social Capital listserv, <soc-cap@ext.jussieu.fr>, moderated by the author and Lise Mounier, also a member of the LASMAS-IdL.

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1 Child of School Age Were Studied. The Cultural Capital of the Families Was Determined by the Professional Status of the Father & Mother, by Their Educational Attainments, & by Sm. Cultural Capital Is Composed of Economic Capital, Social Position, Scholarly Achievements, & Symbolic Capital. The Families under Study Divided into Sc's in Proportion to the Population-with the Wc Holding the Least Capital. With Regard to Cultural Learning, Infancy Is Defined Differently in the Various Classes as Is the Division of Tasks. Distinctions Within the Cultural Realm Differ Greatly So That Culture Is Viewed Differently in Each. The Modes of Training Differ Greatly. The Ethos of the Uc Is Ease, of the Mc Virtue, & of the Lc Survival. These Differences Reflect the Superiority of the Uc Training Patterns with Regard to Such Matters as Creativity; Descriptors - Family-Families, Culture-Cultures-Cultural-Culturally, Transmission; Indexing Phrase - FAMILY TRANSMISSION OF CULTURAL CAPITAL; Subheadings - the family and socialization, sociology of sexual behavior.

The original data set of 87 complete entries constitutes the "Soccap" file[3] of which the below is a typical complete entry with each entry field preceded by an abbreviation consisting of two capital letters. For example, "TI" is title, "AU" is author(s), "IN" is institution, etc.[4]

TI: Social Capital and the Reproduction of Inequality: Information Networks among Mexican-Origin High School Students
AU: Stanton-Salazar,-Ricardo-D.; Dornbusch,-Sanford-M.
IN: Dept Sociology U California San Diego, La Jolla 92093-0102 [e-mail: rstanton@weber.ucsd.edu]
JN: Sociology-of-Education; 1995, 68, 2, Apr, 116-135.
CO: SCYEB7
AVA: Document delivery from University Microfilms International (UMI).
DT: aja Abstract-of-Journal-Article
LA: English
CP: United-States
PY: 1995
AB: Examines the critical role of significant others in status attainment, drawing on social reproduction theories, current research on social ties & adult occupational mobility, & the concept of social capital, defined as social relationships from which an individual is potentially able to derive various types of institutional resources & support. Data obtained via questionnaire survey are used to examine the information networks of a selected sample of 205 Mexican-origin high school students in the San Francisco-San Jose area of CA. Focus is on the relationship between students' grades & educational & occupational expectations & the formation of instrumental ties to institutional agents (eg, teachers & guidance counselors). Although some evidence is found of a relation between grades & status expectations & measures of social capital, their strongest associations were with language measures, suggesting that bilinguals may have special advantages in acquiring the institutional support necessary for school success & social mobility. 2 Tables, 1 Appendix, 49 References. Adapted from the source document. (Copyright 1995, Sociological Abstracts, Inc., all rights reserved.)
DE: Status-Attainment (D832500); Hispanic-Americans (D360600); California- (D104400); High-School-Students (D357900); Social-Networks (D792000); Educational-Plans (D246000); Occupational-Aspiration (D578700)
IP: status attainments, Mexican-origin high school students; social capital resources; questionnaire survey

[3]All files mentioned in this article are available in ASCII text format as email files from the author. For copyright reasons, complete abstracts are only available from *Sociological Abstracts*. Reference information for the 87 *Sociological Abstracts* entries figures below in the Annex.

[4]The labels in parentheses, such as "(D832500)" or "(D104400)", designate specific descriptor terms in the *Sociological Abstracts* thesaurus.

SH: sociology of education; sociology of education (1432); group interactions; social group identity & intergroup relations (groups based on race & ethnicity, age, & sexual orientation) (0410)
CC: 1432; 1400; 0410; 0400
SN: 0038-0407
AN: 9508841
AV: UMI

FILES SOCCAP, KEYWORDS, PHRASES AND WORDS

From this "raw data", I produced three other types of files. First, I "reduced" entries to the form below which retains only the title (TI), author(s) (AU), descriptors (DE), indexing phrase (IP), and year published in *Sociological Abstracts* (AN). In this case, the example above becomes:

TI: Social Capital and the Reproduction of Inequality: Information Networks among Mexican-Origin High School Students
AU: Stanton-Salazar,-Ricardo-D.; Dornbusch,-Sanford-M.
DE: Status-Attainment (D832500); Hispanic-Americans (D360600); California- (D104400); High-School-Students (D357900); Social-Networks (D792000); Educational-Plans (D246000); Occupational-Aspiration (D578700)
IP: status attainments, Mexican-origin high school students; social capital resources; questionnaire survey
AN: 9508841

These reduced entries form the "Keywords" file. The entries are "reduced" further to form the "Phrases" file, keeping only the descriptors and indexing phrase. The example above then becomes the two following entries in the Phrases file:

Status-Attainment (D832500); Hispanic-Americans (D360600); California- (D104400); High-School-Students (D357900); Social-Networks (D792000); Educational-Plans (D246000); Occupational-Aspiration (D578700)

status attainments, Mexican-origin high school students; social capital resources; questionnaire survey

Finally, the Phrases file is used to build the "Words" file consisting of all words in the Phrases file ordered alphabetically. The first page of the Words file is the following:

'unproductive' labor's social necessity
18th century-present
1916-1930
1947-1974 census data;
1947-1980
1963 Yale College alumni
1967-present
1970;
1980 US census data
1985 survey
1986 National Longitudinal Survey of Youth
1986/1988 national survey data
1986/87
1986/87;
1987/88 survey
1989-1992

1989/1992 interview data
1990 national survey data
1991/92 longitudinal study
1992 American Sociological Association meeting
19th-century Brazil;
25-year-reunion class book submissions
3-book review essay;
academic achievement
academic achievement
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Academic-Achievement (D001500)
Accumulation- (D005700)
Action-Theory (D006550)
Action-Theory (D006550)
adaptation
Adjustment- (D007500)
administratively- vs output-driven design
Adolescents- (D008400)
Adolescents- (D008400)
Africa
African
Africans (018500)
agricultural economy
Aristocracy
Aristocracy- (D045000)
Aristocrat
Aristocratic
Aristocrats (035975)
Asian-Cultural-Groups (D051900)
Assimilation- (D053400)
at-risk students
Atu
Australia- (D059700)
Australian children
Authoritarianism-Political-Ideology (D060600)
authority monopoly
Behavior-Problems (D072400)

Each time a word appears as a descriptor or in an indexing phrase, it appears once in the Words file. There are a total of 902 words used to describe the 87 articles, the abstracts of which appear in the Soccap file.

COGNITIVE MAPPING

Using the Words file as our raw data, we performed what is known as a "cognitive mapping" of "social capital", as seen through the entries in *Sociological Abstracts*. Cognitive mapping is a form of "co-word analysis" or the use of co-occurrence of keywords in abstracts as an index of similarity to form "clusters" or "components" (Vinck, 1991). The more frequently two key words co-occur in abstracts together, the "closer" or more "similar" they are, and thus the more likely they are to be members of the same cluster. We used the Leximappe-Lexinet program, which empbodies a procedure that is independent of the specific scientific domain under consideration and can be used for any set of words, even for the analysis of the official biographies of members of the Central Committee of the Communist Party of the former Soviet Union (Van Meter *et al.*, 1991). In other words, the algorithm incorporated in Leximappe-Lexinet does not refer to pre-established dictionaries and instead is statistically and combinatorially based and can therefore be applied directly to the analysis of "social capital".

To choose the important classes or components, and to aid in analyzing them, Leximappe generates two criteria: a statistical mean of the external ties between component members and keywords outside the component; a statistical measure of internal cohesion defined as the mean strength of associations between component members (mean co-occurrence of keywords). These two measures are used, respectively, as the first axis (called Centrality) and the second axis (called Density) to from a "Strategic Diagram" on which each component or cluster can be projected. This means that the more a cluster is to the right in the diagram, the more numerous are the ties of its member keywords to other keywords outside the cluster. The vertical axis means that the more towards the top of the diagram a cluster is situated, the more the ties between keywords within the cluster are dense.

These two axes divide the Strategic Diagram into four quadrants which we call the first quadrant (upper right-hand), the second quadrant (upper left-hand), the third quadrant (lower left-hand) and the fourth quadrant (lower right-hand). This means, by definition, that the first quadrant has relatively dense and central clusters and we use the nickname "Main Stream" to describe it (Vinck, 1991). The second quadrant, with dense but non-central clusters, is labeled "Ivory Tower" science. The third quadrant, with non-dense and non-central clusters, is called variously "up and coming science", "unstructured science" or simply "Chaos". The fourth quadrant, with central but non-dense clusters, has been labeled "Band Wagon" science. Although some researchers have suggested that new clusters may be formed in the "Chaos" third quadrant and move toward the other quadrants (Van Meter, 1995), my research tends to show that clusters appear either briefly in the "Ivory Tower" second quadrant before disappearing, or else in the "Band Wagon" fourth quadrant before moving into either the "Main Stream" first quadrant or towards the "Ivory Tower" (Van Meter *et al.*, 1995).

We have previously used Leximappe-Lexinet to analyze the approximately 860 sociological research articles on AIDS that appear in *Sociological Abstracts* (Van Meter & Turner, 1992) and which produced the Strategic Diagram (Van Meter & Turner, 1997:49) shown in Figure 1.

We used Leximappe-Lexinet to analyze the collection of 87 "social capital" abstracts from *Sociological Abstracts*. We set the program at the minimum "3,3,3" setting which means keywords have to appear at least three times in the data to be taken into consideration, retained keywords must have at least three co-occurrences with other retained keywords, and at least three retained keywords are necessary to form a class. With these minimal parameters, we analyzed our data and found ... nothing. The resulting graph was empty. There are no keywords appearing three times in the data with three ties to other keywords appearing three times in the data. This also means, of course, that there are no cognitive mapping classes or components in "social capital". Adding author names does not solve this problem.

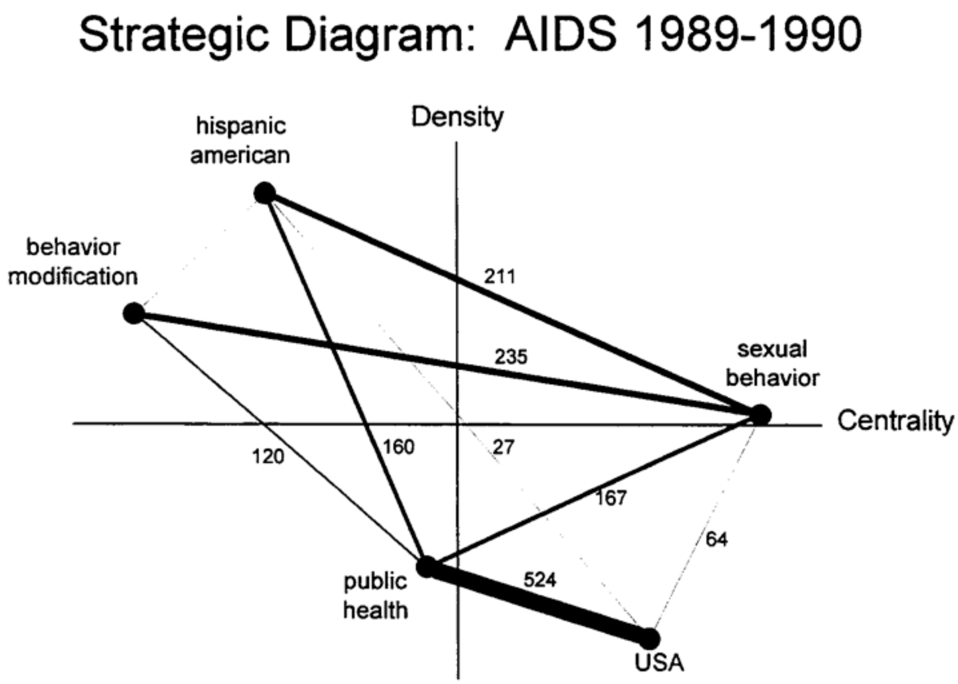

Figure 1. Drawn from *BMS*, n. 56, September 1997, page 49

DATES AND THEMES OF ARTICLES

The obvious conclusion is that "social capital" covers too wide an area to have yet developed an internal structure in the last 27 years[5]. Indeed, on the basis of the *Sociological Abstracts* date data below, we can state that "social capital" is a relatively new concept and in full development. See the frequency of publication of articles by year below:

5x 1995 (only part of 1995 articles were on the CD-ROM)
10x 1994
14x 1993
12x 1992
6x 1991
8x 1990
1x 1989
3x 1988
7x 1986
1x 1985
2x 1984
2x 1983
3x 1982
3x 1981
1x 1980
2x 1977

---

[5]The question of the origin of the term "Social Capital" was the subject of numerous email exchanges on SOCNET (Social Networkers listserv) which were recently republished in this journal (Borgatti, 1998).

2x 1976
3x 1975
1x 1973
1x 1971

The two oldest articles are: James F. Becker, "Class Structure and Conflict in the Managerial Phase - I", *Science and Society*, 1973, 37, 3, Fall, 259-277; Henri Noilhan, "Un Fait Social Capital de l'Epoque Moderne: L'Exode Rural" (An Outstanding Fact of the Modern Era: Rural Exodus), *Revue Internationale de Sociologie*, 1971, 7, 2, Part 1, Aug, 316-320 [this entry is probably an error because the chain of characters "social capital" was found in the French title that does not have the same meaning]. Even a cursory analysis of the dates of publication and associated titles and keywords clearly shows that research themes have varied with time as the concept of social capital apparently "matures" and receives more empirical applications and less theoretical attention.

Even without a cognitive mapping, the thematic structure of the data base can be analyzed using the Words file. I regrouped identical or very similar keywords together in a "Words2" file and ordered it by frequency. It contains 187 keywords varying in frequency from a maximum of 33 to a minimum of 2 (the 715 "singleton" terms were dropped). Frequencies decrease very rapidly from 33 (Social-), to 20 (Econom-), to 13 (Scien-), to 12 for five terms, 11 for two terms, 10 for one term, 9 for four terms, and 8 for two terms. After that, frequencies tend to increase. See below:

33x Social- (428900) (429095) (D780600) (D781200) (D782100) (429850) (D786000) (D788100) (D789600) (D791700) (D797400) (D800700) (D801000) (D801300) (D801300) (D801900) (D802500) (D804000)
20x Econom-y,ies,ic,ics,ical (D238500) (D241500) (D241800) (145000) (145200)
13x Scien-ce,ces,ticity,tific,tism,tization (410000) (D745950) (410380)
12x United States of -America (D890700) (477200)
12x Social Capital
12x Human Capital (D372900)
12x Franc-e,h (D311400) (187500)
12x Family (D285600) (D285700) (D286500) (D287700) (D289300)
11x Political-ly, ization (D639400) (D639600) (D639900) (D641100) (339690)
11x Bourdieu,-Pierre (063925) (D092400)
10x German-y (D326100)
9x Theoretical Problems (D864425)
9x Labor (D436200) (D437100) (D437700) (D438900) (D439500) (D439800)
9x Czech (D194400)
9x Academic Achievement (D001500)
8x Netherlands (D555000)
8x Manage-ment,rs,rial (257500) (D486600)
7x Status Attainment (D832500)
7x Sociolog-y,ists (435000) (D809700)
7x Social Networks (D792000)
7x Occupational Mobility (D579600)
7x Neighbor-hood,hoods,ing,liness,ly (292525) (292500)
7x Income (D386400)
7x Govern-ing,ment,mentss,mental (D334200) (196500)
7x Culture-s (D192000)

7x Class (D134400) (D135300) (090670)
7x Capitalist-ic (D109500) (069400)
6x Region-s,al,alism (377800)
6x Urban (D892200) (D892500)
6x Social Class-es (D781500) (429800)
6x Interviews
6x immigrant-s (D383700)
6x Dropouts (D231300)
6x Capitalism (D109200)
5x Socioeconomic (D807600) (D807600) (434455)
5x Mexic-o,an (D517200)
5x Financ-e,es,ial,ing (179260)
5x Educational (D245575) (D245700) (D246000) (D247200)
5x Domina-nt,nts,nce,tion (136400)
5x Crim-e,inology (D184800) (D186600)
5x Child-ren (D122700) (D124500)
5x case study
5x capital (069390) (D108600)
5x Aristocra-t,ts,tic,cy (D045000) (035975)

But keywords can be further regrouped in the Words2 file. For example, the theme of "Education" covers "High School", "Secondary Education", "Graduate Education", "Academic Achievement", etc., which all figure as separate keywords. Performing this type of regrouping, which cognitive mapping can only do with the intervention of a human operator, produces the "Words3" file of 46 thematic keywords which appear five or more times in our data base (see Figure 2).

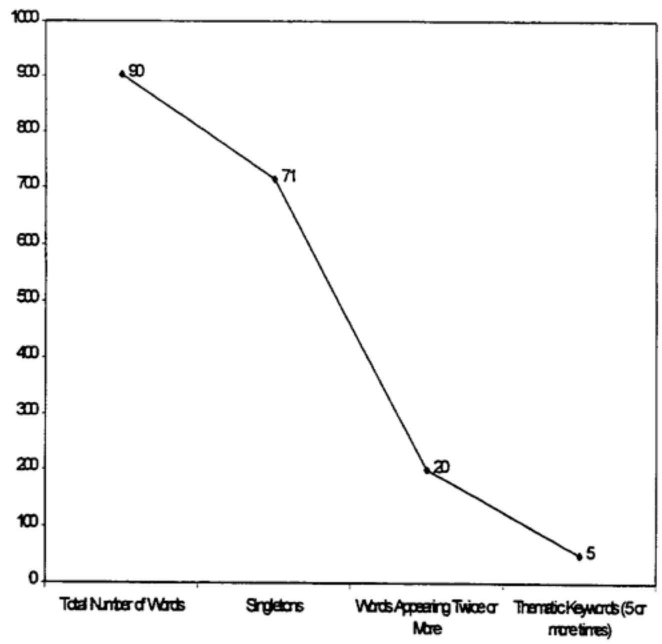

Figure 2.

This produces four main thematic groups. The largest remains "Social-" (54x), followed by "Education" (29x), then "Econom-" (26x), and "Famil-" (24x). The following term, "Questionnaire" (22x), already concerns empirical research methods and not a research theme. The next term, "Cultur-" (20x), precedes a fall in frequencies to "Social Capital" (14x), "Social Class-" (13x), "Scien-" (13x), and "Capital-ism" (13x). For these reasons, we retain Social-, Education, Econom- and Famil- are our main thematic groups, though Cultur- is only slightly less significant. See below:

54x Social (428900) (429095) (D780600) (D781200) (D782100) (429850) (D786000) (D788100) (D789600) (D791700) (D797400) (D800700) (D801000) (D801300) (D801300) (D801900) (D802500) (D804000) (D783600) (429925) (D789000) (D791400) (432238) (D793500) (432260) (432600) (D806100)
29x Education, Private Schools (D661200),Secondary Education-High School (D748800) (D358200) (D357900), Elementary, Public Schools (D682500), Academic Achievement (D001500)
26x Econom-y,ies,ic,ics,ical (D238500) (D241500) (D241800) (145000) (145200) (D237900) (D238800) (D240300)
24x Famil-y,ies,ism (171600) (D285300) (D285600) (D285700) (D286500) (D287700) (D289300) (D286200) (D287400) (D288600)
22x Questionnaire, Survey, Interview, Secondary Data
20x Cultur-e,es,al,ally (D190100) (D191550) (119600) (D192000)
14x Social Capital
13x Social Class-es (D781500) (429800) (D134400) (D135300) (090670)
13x Scien-ce,ces,ticity,tific,tism,tization (410000) (D745950) (410380)
13x Capital-ism,ist,istc (D109200) (D109500) (069400)
12x United States of -America (D890700) (477200)
12x Human Capital (D372900)
12x Franc-e,h (D311400) (187500)
11x Urban (D892200) (D892500) (D892800) (D894300)
11x Theoretical (D864425)
11x Sociolog-y,ists,ical (435000) (D809700) (D809400)
11x Political-ly, ization (D639400) (D639600) (D639900) (D641100) (339690)
11x Bourdieu,-Pierre (063925) (D092400)
10x Occupational (D581100) (D578700) (D579600)
10x Netherlands (D555000)
10x Income (D386400)
10x German-y (D326100)
9x Labor (D436200) (D437100) (D437700) (D438900) (D439500) (D439800)
9x Czech (D194400)
8x Manage-ment,rs,rial (257500) (D486600)
8x Educational (D245575) (D245700) (D246000) (D247200) (D245400)
7x Status Attainment (D832500)
7x Social Networks (D792000)
7x Neighbor-hood,hoods,ing,liness,ly (292525) (292500)
7x Govern-ing,ment,mentss,mental (D334200) (196500)
7x Career-s (D110100) (D109700) (D109800)

The USA, France, Netherlands, Germany and the Czech Republic (and former Czechoslovakia) appear respectively in this list. Several other countries appear as keywords, but Great Britain/United Kingdom is a noted absence. The presence of Pierre Bourdieu (11x) is unique as a sociologist figuring as a significant subject matter keyword. The terms "Occupational", "Income", and "Labor" have been left as they were but could probably be included in the group Econom-. The term "Urban" is a relatively important keyword associated with social capital, particularly when compared with "Rural" which appears only four times. Finally, the only other methodological indications associated with social capital are "Social Networks" (7x) and "Case Study" (5x). This describes a thematic structure represented in Graph II below.

```
55 | Social-
50 |
45 |
40 |
35 |
30 | Education (16*)
25 | Economy (28*) & Family (8*)
20 | Questionnaire & Culture
15 | Social Capital, Social Class & Science
10 | Urban, Theoretical, Politics & Bourdieu
05 | Social Networks
00 ------------------------------------------
      * number of articles classed with this theme.
```

Figure 3

CLASSIFICATION OF ARTICLES IN THREE GROUPS

This structure permits you to return to the Soccap file and make a preliminary classification of the articles. To begin with, the group Social- is so vast and lacking coherence that it covers everything and is of little help in trying to structure the contents of social capital literature. If you make a disjoint classification (an article can be in one and only one class), I would propose the classes of articles for Education, Econom- and Famil- found below (each paragraph or set of keywords represents a single article).

Education

Academic-Achievement (D001500); High-School-Students (D357900); Social-Change (D781200); Family-Relations (D287400); Social-Networks (D792000); Secondary-Education (D748800); secondary school education, social capital loss; parental involvement lack (Clark & Ramsay, 1990).

Academic-Achievement (D001500); Southeast-Asian-Cultural-Groups (D819400); High-School-Students (D357900); New-Orleans,-Louisiana (D560400); Bilingualism- (D079500); Linguistic-Minorities (D466200); academic achievement, native-language literacy role, Vietnamese high school students, New Orleans, Louisiana; survey (Bankston & Zhou, 1995).

Adolescents- (D008400); Mexican-Americans (D517200); Whites- (D919800); Family-Life (D286200); Academic-Achievement (D001500); Familism- (D285300); San-Francisco,-California (D736500); academic achievement, Mexican-origin/Anglo adolescents; familism; 1987/88 survey; San Francisco, California (Valenzuela & Dornbusch, 1994).

Australia- (D059700); Children- (D124500); Academic-Achievement (D001500); Individual-Differences (D389225); Family-Relations (D287400); Educational-Opportunities (D245700); individual attributes/academic achievements/family educational capital relationships, Australian children; interviews; tests (Marjoribanks, 1992).

Career-Patterns (D109800); Educational-Attainment (D245400); Human-Capital (D372900); Youth- (D936600); early employment outcomes, noncollege youth, high school preparation's impact; secondary data, observations, interviews; surveys; students, teachers, employers (Dorsten, 1990).

Equality- (D266700); Czechoslovakia- (D194400); Educational-Systems (D247200); Social-Inequality (D789000); educational equality, Czechoslovakia (Mateju, 1992).

Graduate-Schools (D335000); Graduate-Students (D335100); Environmental-Factors (D264000); Social-Work-Education (D804000); Academic-Achievement (D001500); sociology graduate student performance; organization environment; interview/questionnaire data; program advisors/students, US (Moore & Keith, 1992).

High-Schools (D358200); Public-Schools (D682500); Private-Schools (D661200); Cultural-Transmission (D191550); Bourdieu,-Pierre (D092400); postgraduate cultural/social capital accumulation, public vs prep school students, 1963 Yale College alumni; content analysis; 25-year-reunion class book submissions (Zweigenhaft, 1992).

Human-Capital (D372900); Action-Theory (D006550); Rationality- (D693000); Theoretical-Problems (D864425); High-School-Students (D357900); Dropouts- (D231300); social capital forms/facilitation, rational action paradigm, high school dropouts/families/communities; national longitudinal study (Coleman, 1988).

Human-Capital (D372900); Occupational-Mobility (D579600); Graduates- (D335400); Public-Schools (D682500); Private-Schools (D661200); High-Schools (D358200); Academic-Achievement (D001500); Social-Status (D800700); Prestige- (D656700); cultural/social capital acquisition, public vs prep school graduates; directory data; college freshmen (Zweigenhaft, 1993).

Netherlands- (D555000); Inequality- (D394200); Social-Inequality (D789000); Ethnic-Relations (D271200); Religious-Attitudes (D704550); Minority-Groups (D529500); Ethnic-Minorities (D270600); Educational-Attainment (D245400); Academic-Achievement (D001500); Educational-Inequality (D245575); inequality, ethnic/religious/other groups, Netherlands; journal issue introduction (Huttner & Kleijer, 1990).

Private-Schools (D661200); Public-Schools (D682500); Dropouts- (D231300); Religious-Education (D705900); dropout rates, Catholic vs other independent schools, social capital perspective (Coleman, 1988).

Risk- (D720000); Socioeconomic-Factors (D807600); Family-Structure (D288600); Dropouts- (D231300); Social-Environment (D786000); Schools- (D743700); at-risk students, socioeconomic class/family/school effects; literature review (Vacha & McLaughlin, 1992).

Rural-Youth (D729000); Dropouts- (D231300); United-States-of-America (D890700); Family-Structure (D288600); Educational-Attainment (D245400); dropout rates, rural youth, US; family structure; 1990 national survey data (Lichter, Cornwell & Eggebeen, 1993).

Secondary-Education (D748800); Primary-Education (D658200); Teamwork- (D855300); Organizational-Structure (D593450); Job-Training (D421500); elementary/secondary schools, administratively- vs output-driven design (Coleman, 1993).

Status-Attainment (D832500); Hispanic-Americans (D360600); California- (D104400); High-School-Students (D357900); Social-Networks (D792000); Educational-Plans (D246000); Occupational-Aspiration (D578700); status attainments, Mexican-origin high school students; social capital resources; questionnaire survey (Stanton-Salazar & Dornbusch, 1995).

Economics

Capitalism- (D109200); Capital- (D108600); Individual-Collective-Relationship (D389200); social capital, capitalism, individual liberty-social productivity relationship (Weede, 1992).

Capitalism- (D109200); Productivity- (D663000); Labor-Productivity (D438900); Canada- (D106200); Capitalist-Societies (D109500); Labor-Theory-of-Value (D439800); Forces-And-Relations-of-Production (D308000); Economic-Systems (D241500) (Smith, 1993).

Communist-Societies (D152700); Social-Mobility (D791400); Czechoslovakia- (D194400); Social-Change (D781200); Economic-Change (D237900); Privatization- (D661600); Adjustment- (D007500) (Mateju, 1993).

Czechoslovakia- (D194400); Entrepreneurship- (D262800); Motivation- (D542700); Family-Businesses (D285700); Sociocultural-Factors (D807000); entrepreneurship, postcommunist Slovakia, motivating/enabling factors; family biography data (Kusa & Tirpakova, 1993).

Economic, Economics, Economical (145000); Culture, Cultures, Cultural, Culturally (119600); Social-relations, Social-relationships (432600); Dominance, Domination, Dominant, Dominants (136400) (Bourdieu, 1976).

Economic, Economics, Economical (145000); Culture, Cultures, Cultural, Culturally (119600); Social- (428900); Capital- (069390); capital accumulation/its implications, economic/cultural/social capital analysis (Bourdieu & Kreckel, 1983).

Economic-Policy (D240300); Policy-Implementation (D636500); Social-Factors (D786600); Social-Structure (D801300); Theoretical-Problems (D864425); Economic-Theories (D241800); economic action, social structural determinants, theoretical issues (Portes & Sensenbrenner, 1993).

Equality- (D266700); Czechoslovakia- (D194400); Educational-Systems (D247200); Social-Inequality (D789000); educational equality, Czechoslovakia (Mateju, 1992).

France, French (187500); Department, Departments, Departmental, Departmentalization (127900); Finance, Finances, Financial, Financing (179260) (Charle, 1982).

France- (D311400); Decentralization- (D200700); Economic-Policy (D240300) (Rousseau & Hunt, 1986).

Germany- (D326100); Social-Movements (D791700); German-Democratic-Republic (D325500); social structures/work careers, reunification's impact, Germany (Berger, 1991).

Income, Incomes (227600); Redistribution- (376600); Govern, Governing, Government, Governmental, Governments (196500) (Olson & Olson, 1981).

Job-Change (D419700); Social-Networks (D792000); Detroit,-Michigan (D213300); Resource-Allocation (D714000); job change outcomes, social network resource effects; survey, career histories; Detroit, Michigan; 1970 (Marsden & Hurlbert, 1988).

Job-Search (D421200); Netherlands- (D555000); Managers- (D486600); Firms- (D303900); Human-Capital (D372900); Income- (D386400); Resources- (D714600); Social-Factors (D786600); social-human capital relationship, income attainment process, managers; 1986/87, questionnaire data; managers, Dutch firms (Boxman, de Graaf & Flap, 1991).

Lawyers- (D450000); New-York-City,-New-York (D561300); Sex-Differences (D758100); Professional-Women (D666300); Professional-Workers (D666600); Time-Utilization (D867000); Flexibility- (D305700); professional careers, flexible time requirements, gender issues; interviews; lawyers, New York City (Seron & Ferris, 1995).

Migrants- (D522600); Washington,-D.C. (D912600); Human-Capital (D372900); Work-Experience (D925500); Wages- (D910500); Sex-Differences (D758100); Income-Inequality (D387000); Social-Factors (D786600); Occupational-Mobility (D579600); labor market experiences, central American migrants; human capital/structural variables; interview data; Washington, DC (Repak, 1993).

Netherlands- (D555000); Human-Capital (D372900); Income- (D386400); Occupational-Mobility (D579600); income attainment process, social-human capital relationship, Dutch business managers; questionnaire data; 1986/87 (Boxman, Flap & de Graaf, 1990).

Occupational-Mobility (D579600); Immigrants- (D383700); Labor-Market (D437100); United-States-of-America (D890700); Ethnic-Minorities (D270600); economic mobility, immigrant minority groups, US; statistical/secondary data; Dominicans/Chinese/Cubans, New York City/Miami, Florida (Portes & Zhou, 1992).

Prague,-Czech-Republic (D652100); Slovak-Republic (D776000); Postcommunist-Societies (D649400); Czechoslovakia- (D194400); Political-Development (D639400); Economic-Development (D238800); Intergroup-Relations (D404700) (Machonin, 1994).

Profit, Profits (348615); Growth- (200200); Reagan,-Ronald, Reaganomics (371660); profit politics/growth geography, Reagan administration (Friedland, 1983).

Property, Properties (351300); Prostitute, Prostitutes, Prostitution (351362); Production, Productivity, Producer, Producers (348300); Ownership- (314700); Economy, Economies (145200); Africa, African, Africans (018500) (Bujra, 1977).

Social-Class (D781500); Careers- (D110100); Career-Patterns (D109800); Occupational-Mobility (D579600); Germany- (D326100) (Holtmann & Strasser, 1990).

Social-class, Social-classes (429800); Inequality, Inequalities (232150); Political, Politically, Politicalization-see-also-Politics (339690); Sociology- (435000) (Kreckel, 1982).

Social-Networks (D792000); Managers- (D486600); Income- (D386400); Sweden- (D846900); Social-Background (D780600); Human-Capital (D372900); Firms- (D303900); income attainment, management; human/social capital; 1985 survey; Swedish public firms (Meyerson, 1994).

South-Korea (D818700); Firms- (D303900); Human-Capital (D372900); Organizational-Structure (D593450); Constraints- (D170000); Managers- (D486600) (Lee, 1994).

Status-Attainment (D832500); Occupational-Status (D581100); Social-Networks (D792000); Netherlands- (D555000); Occupational-Mobility (D579600); Males- (D484200); occupational status distribution/attainment; social networks; secondary data analysis; employed men, Netherlands (Flap & de Graaf, 1986).

United-States-of-America (D890700); Quality-of-Life (D687300); Labor-Supply (D439500); Social-Mobility (D791400); social capital return, labor mobility-general welfare level relationship; hypothetical model (Schiff, 1992).

Yugoslavia- (D937500); Economic-Crises (D238500); Economic-Development (D238800) (Mihailovic, 1986).

Family

Eighteenth-Century (D249600); Reconstruction- (D697050); Family- (D285600); Society- (D806100); History-of-Sociology (D361800); Sociological-Theory (D809400); societal/familial reconstruction, 18th century-present, sociology's changing focus; Presidential Address, 1992 American Sociological Association meeting (Coleman, 1993).

Family, Families (171600); Culture, Cultures, Cultural, Culturally (119600); Transmission- (471500); FAMILY TRANSMISSION OF CULTURAL CAPITAL (Lienard, & Servais, 1975).

Family-Life (D286200); Parent-Child-Relations (D603900); Behavior-Problems (D072400); Human-Capital (D372900); Cultural-Transmission (D191550); Children- (D124500); children's social norms internalization vs behavioral problems; family social capital; 1986/1988 national survey data (Parcel & Menaghan, 1993).

Family-Research (D287700); Family-Relations (D287400); Kinship- (D433200); Social-Reproduction (D797400); Inheritance-And-Succession (D397500); Exchange-Economics (D278400); kinship relations, modern society, economic/social reproduction functions (Dechaux, 1990).

France, French (187500); Marriage, Marriages, Marital (259000); Family, Families (171600); Rural-see-also-Ru, Ur (398400); Aristocracy, Aristocratic, Aristocrat, Aristocrats (035975); marriage/family relations, French rural aristocracy; interviews (Merllie & Cousquer, 1980).

France- (D311400); Aristocracy- (D045000); Class-Formation (D135300); nobility characteristics, France (Saint Martin & Wilke, 1991).

Parent-Child-Relations (D603900); Family-Work-Relationship (D289300); Work-Environment (D925200); Working-Women (D930900); Child-Development (D122700); Working-Mothers (D930800); Psychosocial-Factors (D678800); early maternal employment, children's behavioral/cognitive outcomes; 1986 National Longitudinal Survey of Youth (Parcel & Menaghan, 1994)).

Social-Networks (D792000); Family-Relations (D287400); Occupational-Mobility (D579600); Status-Attainment (D832500); Netherlands- (D555000); United-States-of-America (D890700); Federal-Republic-of-Germany (D294900); status attainment/occupational prestige, Netherlands/US/Federal Republic Germany; informal/family contacts (Flap & de Graaf, 1985).

AUTHORS

Since the cognitive mapping graph was empty, I couldn't introduce author names to see their influence on thematic structure. Above, I already noted the presence of Pierre Bourdieu among the thematic keywords. You find him below at the top of the list of authors of articles in the data base.

5x Bourdieu,-Pierre
4x Coleman,-James-S.
4x Flap,-Hendrik-Derk
3x Zhou,-Min
3x Wacquant,-Loic-J.-D.
3x Mateju,-Petr
2x Portes,-Alejandro
2x Parcel,-Toby-L.
2x Menaghan,-Elizabeth-G.
2x Kreckel,-Reinhard
2x Dornbusch,-Sanford-M.
2x De-Graaf,-Paul-M.
2x de-Graaf,-Nan-Dirk
2x Boxman,-Ed-A.-W.
2x Bankston,-Carl-L.,-III

There are a total of 103 authors, of which 88 wrote only one article figuring in the data base. Those who wrote two or more articles figure in the list above. Thus, 15 authors (15%) published 40% of the articles concerned. It should be noted that Bourdieu is the leading author and leading individual as a thematic subject. Coleman, second-ranking author, does appear as a subject in some of the articles, but rarely as a descriptive thematic keyword. With these two leading figures taken care of, we enter the world of social network analysis with Flap, Zhou, Wacquant and others. Indeed, social network analysts dominate the above list, except for Bourdieu and Coleman.

JOURNALS

Strangely enough, this dominant presence of "networkers" does not hold true for "network" journals. Below, I list the 15 articles in the data base which include the term "social network". One should note that the articles are published in 14 different journals. Only the Dutch journal, *Mens en Maatschappij*, published more than one social network article on social capital. This includes *Social Networks*. In short, even if "social networkers" dominate social capital publishing, their social capital-social network articles are published throughout the field of sociological journals and not preferentially by "network" journals. I discovered a similar situation for sociological AIDS research where "traditional" journals "captured" this new theme and, as a result, few new journals appeared, and few journals specializing in associated areas "absorbed" much AIDS publishing and did not dominate the field (Van Meter & Turner, 1997).

TI: Social Capital and the Reproduction of Inequality: Information Networks among Mexican-Origin High School Students
AU: Stanton-Salazar,-Ricardo-D.; Dornbusch,-Sanford-M.
JN: Sociology-of-Education; 1995, 68, 2, Apr, 116-135.

TI: Social Capital and the Adaptation of the Second Generation: The Case of Vietnamese Youth in New Orleans
AU: Zhou,-Min; Bankston,-Carl-L.,-III
JN: International-Migration-Review; 1994, 28, 4(108), winter, 821-845.

TI: Human Capital, Social Capital and Compensation: The Relative Contribution of Social Contacts to Managers' Incomes
AU: Meyerson,-Eva-M.
JN: Acta-Sociologica; 1994, 37, 4, 383-399.

TI: Foundations of Social Theory; Grundlagen der Sozialtheorie
AU: ----; Buschges,-Gunter; Friedrichs,-Jurgen; Kuhnel,-Steffen; Weiss,-Johannes
JN: Soziologische-Revue; 1994, 17, 3, July, 273-289.

TI: Labor Market Experiences of Central American Migrants in Washington, D.C.
AU: Repak,-Terry-A.
JN: Migration-World-Magazine; 1993, 21, 2-3, 17-22.

TI: Freedom, Knowledge and Law as Social Capital
AU: Weede,-Erich
JN: International-Journal-on-the-Unity-of-the-Sciences; 1992, 5, 4, winter, 391-409.

TI: From the "Promised Land" to the Ghetto. The Great Black American Migration, 1916-1930; De la "terre promise" au ghetto. La Grande Migration noire americaine, 1916-1930
AU: Wacquant,-Loic-J.-D.
JN: Actes-de-la-recherche-en-sciences-sociales; 1993, 99, Sept, 43-51.

TI: Social Capital, Labor Mobility, and Welfare: The Impact of Uniting States
AU: Schiff,-Maurice
JN: Rationality-and-Society; 1992, 4, 2, Apr, 157-175.

TI: The Impact of Social and Human Capital on the Income Attainment of Dutch Managers

AU: Boxman,-Ed-A.-W.; De-Graaf,-Paul-M.; Flap,-Hendrik-D.
JN: Social-Networks; 1991, 13, 1, Mar, 51-73.

TI: The Interplay between Social and Human Capital in the Income Attainment Process of Dutch Managers; De invloed van sociaal en menselijk kapitaal op het inkomen van Nederlandse managers
AU: Boxman,-Ed-A.-W.; Flap,-Hendrik-D.; De-Graaf,-Paul-M.
JN: Mens-en-Maatschappij; 1990, 65, 4, Nov, 379-395.

TI: The Importance of Family and Network of Other Relationships in Children's Success in School
AU: Clark,-E.-Eugene; Ramsay,-William
JN: International-Journal-of-Sociology-of-the-Family; 1990, 20, 2, autumn, 237-254.

TI: Social Resources and Mobility Outcomes: A Replication and Extension
AU: Marsden,-Peter-V.; Hurlbert,-Jeanne-S.
JN: Social-Forces; 1988, 66, 4, June, 1038-1059.

TI: Culture, Taste, and Distinction. Pierre Bourdieu's Sociology of Culture; Kultur, Geschmack und Distinktion. Grundzuge der Kultursoziologie Pierre Bourdieus
AU: Muller,-Hans-Peter
JN: Kolner-Zeitschrift-fur-Soziologie-und-Sozialpsychologie; 1986, supplement 27, 162-190.

TI: Social Capital and Attained Occupational Status
AU: Flap,-Hendrik-Derk; de-Graaf,-Nan-Dirk
JN: Netherlands-Journal-of-Sociology / Sociologia-Neerlandica; 1986, 22, 2, Oct, 145-161.

TI: Social Capital and Attained Job Status; Sociaal kapitaal en bereikte beroepshoogte
AU: Flap,-H.-D.; de-Graaf,-Nan-Dirk
JN: Mens-en-Maatschappij; 1985, 60, 4, Nov, 325-344.

Out of a total of 87 articles, 53 were published in a journal which published only one social capital article. Again, this is similar to results concerning sociological AIDS research. The remaining 34 articles were published by 13 journals. The distribution, with year of publication, is given below:

5x *Actes de la recherche en sciences sociales*; 1976, 1976, 1980, 1982, 1993.
5x *American Journal of Sociology*; 1988, 1993, 1994, 1995, 1995.
3x *Kolner Zeitschrift fur Soziologie und Sozialpsychologie*; 1982, 1984, 1986.
3x *Sociologicky Casopis*; 1992, 1993, 1993.
2x *Cahiers Internationaux de Sociologie*; 1975, 1977.
2x *Dissertation Abstracts International;* 1990, 1994.
2x *Mens en Maatschappij*; 1985, 1990.
2x *Science and Society*; 1973, 1993.
2x *Sociologia*; 1993, 1994.
2x *Sociological Forum*; 1991, 1993.
2x *Sociologie et Societes*; 1975, 1990.
2x *Socioloski Pregled*; 1986, 1986.
2x *Soziale Welt*; 1983, 1991.

Bourdieu published twice in *Actes*, which was the journal of his research center. Otherwise, both Bourdieu and Coleman published each of their social capital articles in different journals.

Once again, we note the absence of any "network" journal, but a fairly even distribution of well-known "general" sociological research journals.

CONCLUSIONS AND FURTHER RESEARCH

The work of regrouping keywords together into more general classes could be used to recode the original data base and apply the Leximappe-Lexinet program of cognitive analysis. But we would in all likelihood simply reproduce the results we have presented above with "Social-" tied to everything ("bandwagon science"), if structured at all, and "Education", "Econom-" and "Famil-" forming more or less coherent groups, probably with Education closest to "mainstream science" with Famil- close by and Econom- not far away, but tending toward "ivory tower" science.

What is needed for a useful and significant application of cognitive mapping is a much larger "social capital" data base[6] and a more systematic recoding/regrouping of keywords than we have done here. But with less than 100 articles, such work lacks statistical significance and can only act as an overall indication of evolution in the sociological research literature on social capital.

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[6]During the presentation of this paper at the Sitges conference, session chairman, Hendrick Derk Flap, who also appears as third-ranking author in the list of social capital authors, noted that a lot of social capital literature is also published in political science and economics journals. See, for example, the World Bank's social capital bibliography at <http://www.worldbank.org/poverty/scapital/>

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ANNEX - THE 87 *SOCIOLOGICAL ABSTRACTS* SOCIAL CAPITAL ENTRIES

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Broadbent's *Environmental Politics in Japan*

Reviewed by
William B. Stevenson, *Boston College*

Broadbent, Jeffrey. 1998. *Environmental Politics in Japan: Networks of Power and Protest.* Cambridge: Cambridge University Press. This book raises an interesting question: How can an industrial society such as Japan undergo rapid economic growth and reduce industrial pollution at the same time? This is, in Broadbent's words, the "Growth-Environment" dilemma that faces all industrial societies. The Japanese underwent an economic miracle after World War II that found them becoming very successful as an industrial nation in the 1960s while at the same time creating severe air and water pollution. The Japanese economic miracle was followed by something of a pollution reduction miracle in the 1970s as Japan managed to reduce many major pollutants at a faster rate than other industrialized countries including the United States.

The Japanese managed to reduce pollution despite facing a number of social dilemmas that made social change difficult. For instance, Japanese society is very hierarchical with a great deal of deference to leaders and yet some of these leaders had to be opposed to stop pollution. Japanese religions such as Shintoism revere nature and yet the natural world of Japan was being sacrificed for rapid industrialization. The Japanese are very locally oriented and the Japanese failed to establish national environmental groups, yet large international businesses were persuaded to change course.

Jeffrey Broadbent manages to explain the resolution of these dilemmas that confronted the Japanese environmental movement by drawing on a number of academic literatures. Many commentators have emphasized how the cooperativeness and willingness to follow orders of the team oriented Japanese labor force has led to the great success of Japanese multinational organizations. By contrast, Broadbent provides insights into how the Japanese environmentalists were capable of generating a great deal of resistance to the economic and political status quo supported by political and business elites who were bent on continuous industrial expansion at the expense of environmental values. In explaining the grass-roots resistance that was generated, Broadbent shows a sweeping knowledge of the social movement literature by comparing hypotheses generated from a number of perspectives. A student of social movements would learn a great deal by considering how he tests a number of competing hypotheses from these perspectives, rejecting some and supporting others. At the same time, he provides insights into how social movements, such as environment movements, operate at the grass-roots level in Japan, and he constantly contrasts the operation of the grass-roots environmental movement in Japan with the United States.

Broadbent's methods in testing hypotheses are not those of the typical quantitative network researcher. There are no network diagrams in the book, and there are no heroic attempts to interpret the results of a structural equivalence printout. Rather the study is a painstaking recreation of the history of a series of events in a eight villages along the coast of Japan. The author is uniquely qualified to write about events in these villages because he lived in several of these villages for 30 months and then spent 14 years working on this book.

The care and effort taken by Broadbent is readily apparent. He doesn't present one case study of a village; he studies eight villages under contrasting circumstances. Some villages supported industrial growth even though the resulting pollution would destroy the local fishing industry and beaches. Other villages were opposed. The differing strategies of actors acting within slightly different social circumstances contained within an overarching similar cultural and political context allow Broadbent to look at variation in variables that lead to social resistance or support of industrial growth. By focusing on these villages Broadbent can develop rich, nuanced details of events, but, at the same time, he also steps back from the village to examine the regional prefectural politics and national politics.

This comparison of village, prefecture, and national forces leads to an elegant model of how political struggles in Japan take place. Broadbent shows how the "triple control machine" of the Liberal Democratic Party, the prefectural government, and big business exert control through patronage and personal persuasion, or what he calls "soft control", through networks of personal contacts. At the same time, this machine is not perfect; not all government actors are in favor of unregulated economic growth, and political patronage relations are weaker among the younger post-war generation of Japanese who are more willing to oppose authorities.

The ultimate outcome of resistance to the machine is not dissimilar from attempts by environmentalists to alter development in other Western democracies. In many industrialized countries, local people become upset at industrial polluters, win concessions from business, but business later continues it development agenda, albeit with cleaner technologies. However, Broadbent is constantly reminding the reader that even though the economic problems of development are similar, the social and political rules of Japan are different. Japan is an hierarchical society in which people are well-aware of their social rank. In this stable order face-saving is very important. Thus officials would say that they were going to change their development plans to not offend protesters, but would not actually change anything. "Consensus" is also very important in deciding social issues in Japan. Consensus in the Western sense would mean that contrasting views are expressed in a political arena and participants reach an agreement. In Japan, consensus for government officials was defined as the "non-expression of protest" by the opposition (p. 304). Thus, from the government's point of view, consensus would be achieved if the government presented plans for development and protests quieted down.

Broadbent's answer to how the Japanese could produce a "pollution miracle" after producing a post-war economic miracle is that the Japanese responded to pollution because of its social intensity in terms of number of people affected rather than pollution intensity in terms of quantity of pollution. Their response did take place in terms of a class structure controlled by a big business-labor coalition, but this is true of many other countries, thus Broadbent rejects class mobilization arguments as the answer to their more successful response to pollution. Social mobilization arguments resting on establishing frameworks of values to mobilize citizens is also rejected. In this case, frameworks of cultural values and beliefs were so diverse as to provide everyone with a rationalization for their actions.

Ultimately, Broadbent argues, the Japanese were mobilized to oppose polluters through informal networks. The horizontal networks among the political and business elite were mobilized to oppose protesters and support allies. Laws were intentionally vaguely written under the assumption that informal networks of connections were the real source of power that would be used to interpret laws. Similarly, the protesters were also able to mobilize village opposition through their networks. Strong leadership at the village level, often a high school teacher who was revered in the local community and able to resist the bribery attempts of the local arm of the national Liberal Democratic Party, was also a key ingredient in mobilizing opposition through networks.

In reaching these conclusions Broadbent provides an intriguing theoretical synthesis of materialist, institutional, and cultural theories and how the assumptions of these theories intersect with the degree of structuration of the social field. Structuration is cleverly defined as a continuum of freedom of action from structured through established patterns of action to agentic where actors are free to innovate with an interesting midpoint of "plastic" in which actors can exert agency when faced with contradictory structures. The combination of three theoretical perspectives with three states of structuration produces a nine-fold table of power structures that Broadbent uses to interpret the historical events.

This book is an impressive research document and an ambitious theoretical undertaking. At times, however, I wished that Broadbent had tried to be a little more reductionist. Finishing the book by explaining events in terms of nine theories is very comprehensive but a more parsimonious explanation might be more satisfying to the reader. Broadbent argues that this social movement study is not amenable to a "fixed general theory" (p. 360), and I would not want the author to sacrifice any of the rich historical detail in an effort to fit the events into a box. However, Broadbent's methodology focuses on producing a very detailed narrative without judgment as to the most important causal connections among events. Narrative methodologies exist (e.g., Abbott, 1992) to formalize the relationships among events to help researchers glean the important events and causal connections, and these techniques have been applied to historical studies of environmental events (Stevenson and Greenberg, 1998).

Some readers may feel frustrated that more quantitative network techniques were not used to determine variations in networks across these villages in order to reduce some of the complexity of the data. The reader who would like a more quantitative network comparison of policy networks across Japan, the U.S., and Germany could consult another book that Broadbent co-authored (Knoke, et.al., 1996). Broadbent also speculates in an appendix as to how one could quantify attempts at political influence in a set of vectors. (In a personal communication to the editor of this journal, Broadbent suggests modifying his hypothesized vectors that predict the relative explanatory weight given a theory on an outcome. This modification will be incorporated in the paperback version of the book.)

These are minor criticisms of an extremely impressive work of scholarship. After reading this book, I was left with a rich understanding of the Japanese social, political, and cultural context. I found the synthesis of theoretical perspectives to be extremely thought-provoking. This book makes a major contribution to the literatures on policy networks, social movements, environmental activism, and the structure-agency relationship.

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1999 Sunbelt International Social Networks Conference

Hawthorn Suites Hotel, Charleston, South Carolina. February 18-21, 1999

Workshops

Introduction to the Analysis of Network Data

Stephen Borgatti
University of South Carolina
Martin Everett
University of Greenwich

Thursday 8:30-4:00
(Ticket Required for Admission)

A beginner's 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 free copy of UCINET IV and KRACKPLOT software, which we use to provide hands-on experience analyzing real data using the techniques covered in the workshop. Participants also receive a glossary of network terminology, a set of detailed exercises (with answers), and a set of lecture notes. 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 that they demonstrated by the instructors. Cost: $50 for students, $100 for all others.

Generating Images of Networks

Lin Freeman
University of California, Irvine

Thursday 12:30 - 4:30
(Ticket Required for Admission)

This is a tutorial on generating network images for exploratory data analysis, publication and web display. Those enrolled will be introduced to the available programs and given a chance to try their hands. Each will be provided with a CD-ROM containing all the programs that are currently used. Particular emphasis will be placed on MAGE, a 3D color display program that is now available to authors writing for the journal, *Social Networks*. Cost: $25 for students, $50 for all others

A Non-Technical Introduction to Social Network Analysis

Barry Wellman
University of Toronto

Friday, 12:00-3:00
(Ticket Required for Admission)

The workshop introduces the underlying philosophy of social network analysis. It sketches the history of the paradigm, identifies its principles, distinguishes between whole network and ego-centered network research, and provides an overview of basic research methods, including block-modeling, clustering, and egocentric approaches using standard statistical packages such as SAS. It reviews highlights of substantive research in a number of areas (including community analysis, social support, inter-corporate relations, politics, migration, and world systems). Barry Wellman, University of Toronto, is the founder of INSNA. Cost: $30.

Workshop on p: Introduction, Generalizations, and Applications*

Noshir Contractor
University of Illinois
Brad Crouch
University of Illinois and The Gallup Organization
Laura Koehly
University of Iowa
Ann Mische
Columbia University
Pip Pattison
University of Melbourne
Garry Robins
Deakin University
Stanley Wasserman
University of Illinois

Wasserman and Pattison (1996, *Psychometrika*) introduced a family of models, p*, to the social network community. These models, which can be fit approximately using logistic regressions, are based on the breakthrough Markov random graph distributions of Frank and Strauss (1986, *JASA*). The models, which have been elaborated upon extensively during the past three years, hold much promise for social network analysis. A good, readable, introduction to p* can be found in Anderson, Wasserman, and Crouch (forthcoming, *Social Networks*). The purpose of this (free!) workshop is to introduce p*, and to describe its many generalizations, including extensions to multiple relational networks, valued networks, and networks containing collections of actor attribute variables. In addition, applications of these models to a variety of substantive problems will be described (including cognitive social structures and social influence). We will also discuss (briefly) the mathematics behind the models, and techniques to estimate the model parameters. Another goal of the workshop is to help researchers identify and compare the various types of analyses and hypotheses that can be addressed by using the p* analytic framework (as compared to other network analytic techniques). These models use the probability of a social network as the response variable, and various functions of network structural properties and/or actor attribute variables as explanatory properties. p* models are fit approximately as auto-logistic regressions, and arise from research on spatial processes. This approximate p* formulation also allows network measurements to be viewed in a standard response/explanatory variables setting in which the response variable is the conditional log odds of the probability that a relational tie is present. The explanatory variables can be quite general, including network structural properties like the tendency towards centralization, mutuality or transitivity, as well as nominal, discrete or continuous actor attributes and the interactions between these elements. The workshop will begin at noon, on Friday and Saturday during the conference,and will last for three hours each day.

The aim of Day 1 is to introduce the p* class of models. It is intended to be of particular interest to individuals who are not necessarily familiar with the models but who are interested in why they might be useful and in what is involved in constructing and fitting them. In addition, there will be some coverage of directions for more complex modelling.

The aim of Day 2 is to outline further applications and new directions. We will attempt to show how one can approach complex dependencies among network tie and node attribute variables, leading to a generalization of the p* framework. Models for social influence, cognitive social structures, tripartite graphs, and discrete time longitudinal networks will be discussed. In addition, new developments that allow the modeling of higher-order network configurations will be introduced. Day 2 is intended to be of interest not just to those who have attended Day 1 of the Workshop but also to those in the the broader network community who already have some familiarity with p* models perhaps from attendance at previous p* sessions in San Diego or Barcelona, the literature, or our web site

http://kentucky.psych.uiuc.edu/pstar/index.html

Day 1. p*: Introduction (Pip Pattison--- Chair)

A. Introductory remarks - Stanley Wasserman
  Example 1: Univariate graphs and directed graphs (with data)

B. Estimation -- Approximate and Exact -- Brad Crouch
  Example 2: Pseudo-likelihood functions, logistic regressions, and maximum likelihood estimation

C. Extensions to Multiple Networks -- Stanley Wasserman
  Example 3: Pooling data across related groups

D. Generalizations to Multivariate and Valued Relations -- Pip Pattison
  Example 4: The utility of p* (with lots of illustrations)

E. Theoretical considerations -- Nosh Contractor
  Example 5: Substantive theories and hypothesis testing

Day 2. p*: Applications and New Directions (Stanley Wasserman--- Chair)

A. Constructing p* models using dependence graphs: General formulation --Pip Pattison

Example 6: models for k-partite networks: actors, groups, projects and events in the Brazilian impeachment movement - Garry Robins and Ann Mische

B. Cognitive social structures -- Laura Koehly
  Example 7: formulating dependence assumptions for cognitive social structures and variations

C. Introducing directed dependencies: models with network tie and node attribute variables: General formulation -- Garry Robins
  Example 8: predicting event participation during the Brazilian impeachment - Garry Robins and Ann Mische

D. Beyond Markov models: a general formulation
  Example 9: higher-order network structures and generalized exchange -- Pip Pattison
  Example 10: mediation in the Brazilian impeachment movement --- Garry Robins and Ann Mische

TL1—Visualization (David Krackhardt)

Analysing Social Network Data by Means of Visualisation Techniques

Patrick Kenis
Free University, Amsterdam

In this presentation it will be shown that social network data can effectively be analysed by means of visualisation techniques. Usually social network data are analysed by calculating structural and locational property measures and/or by confronting them with specific theories. In these contexts visualisations are often used to "illustrate" the findings. This presentation will show that visualisation techniques can be used as an additional way to analyse data. It will be argued and illustrated that network visualisation can go far beyond "illustration". Network visualisation can help to improve communication about the data to third parties; it can help researchers to better explore specific properties of certain networks or facilitate the exploration of differences across social networks; or it could even serve to discover explanations for social phenomena. In order to reach the above aim, visualisation techniques are necessary which go beyond those, which are available at the moment. Visualisation techniques will be presented which are developed at the moment at the University of Konstanz (at the Faculty of Mathematics and Computer Science and the Faculty of Public Policy and Management). The techniques developed are based on the principle that an effective visualisation is a combination of providing an algorithmic solution to a substantive problem in such a way that basic design principles are respected The contention that effective visualisation can be an important instrument in the analysis of social network data will then be illustrated by data from a comparative social network study. The study compares 9 German municipalities in their effectiveness for providing HIV preventive measures for intravenous drug-users. The hypothesis being that it is the structural properties of the drug policy networks in these municipalities, which explain the degree of presence of preventive measures.

Visualizing Big Networks: The 8000 Nodes and 36000 Links in the Colorado Springs Study

Arthur Dryver and Martina Morris
The Pennsylvania State University
John Potterat and Stephen Muth
El Paso Cty Dept of Pub Health and Env Protection

Visualization tools are an important component of both exploratory and confirmatory data analysis. Multivariate data, and networks are a form of this, present unique challenges for visualization. A good example of the strengths and weaknesses of such tools can be seen in Chernoff's faces. While these provide a clever visual analog for multivariate clustering techniques, with much more intuitive access to the underlying data structure, their usefulness is also limited to small data sets. Network visualization tools often have similar strengths and weaknesses. In the process of analyzing the Colorado Springs Project 90 Network data set we have had to grapple with this problem. The network data were collected over the span of five years and contain information from 595 respondents on 8166 unique contacts, and 36838 dyads over time. We will present some of the successes and failures of our effort to visualize this network using Pajek. The application will focus on the use of network images in the analysis of the overlay of sex and needle sharing networks.

Analysis of Genealogies Using Pajek

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Vladimir Batagelj and Andrej Mrvar
University of Ljubljana

Pajek is a program package for analysis and visualization of large graphs and networks. Genealogies are examples of large networks available already in a computerized form on the Internet. Pajek supports, besides usual Ore-graph also p-graph representation of genealogies, which is more convenient for their visualization and analysis. Several standard network analysis procedures can be used for analysis of (large) genealogies represented as p-graphs, e. g.:biconnected components, pattern searching, and different statistics, including the relinking index as a measure of degree of marital relinking among families. Approaches to the creation of structural variables, the decomposition of genealogies according to biconnected components, lineages, etc., and the dynamic visualisation of genealogies (kinemages) will also be presented.

A1—Inter-Organizational (Dean Behrens)

An Analysis of Structural and Relational Embeddedness in the Steel and Semiconductor Industries

Tim Rowley and Dean Behrens
University of Toronto

Network researchers argue that both relational embeddedness - relationship characteristics - and structural embeddedness - structural characteristics - influence firm behavior and performance. Using strategic alliance networks in the semiconductor and steel industries, we examining the interaction of these factors. The primary findings suggest that the interaction of these variables is relevant: a firm that is embedded in its industry's strategic alliance network via strong ties to its partners, who are densely connected to one another, is poorly situated in the network. We argue that dense interconnections and strong ties are alternative social control mechanisms, which in combination provide little additional benefit. Because of the costs associated with maintaining strategic relationships, the utilization of strong ties in a dense network takes resources away from other functions that can add value to the firm. In other words, the roles that interconnectedness and tie intensity play in firm performance depend on each other, and discussing these features independently may be misleading. In addition, although past research convincingly argues that tie intensity and performance are positively related, our study of strategic alliance networks suggests that the nature of this relationship depends on the industry context. Semiconductor and steel firms are affected differently by their networks.

Blunting the Effects of Competition: The Strategic Importance of Social Structure

Wolfgang Bielefeld
University of Texas at Dallas
Joseph Galaskiewicz
University of Minnesota

Strategy theorists have identified a host of tactics that managers can employ to mute competition and gain a strategic advantage. This paper adds to this literature by arguing that nonprofit organizations often use social structures to neutralize the competition they face for donors and/or clients. That is, to mute competition among themselves, nonprofits accrue social status, create informal ties with those in competing organizations, and engage in joint ventures and partnerships with competitors. More specifically, we will model organizations' perceptions of others as competitors as a function of their niche position (an objective measure of competition), their social status, the existence of friendship ties across organizational boundaries, and patterns of interorganizational cooperation. We subsequently want to predict friendship formation and cooperation across organizational boundaries at later points in time looking at perceptions of competition at earlier points in time. We analyze data from a panel study of 156 nonprofit organizations in Minneapolis-St. Paul that were collected between 1980 and 1994. Data were gathered on organizations' niche positions, social status, and interorganizational relationships as well as their perceptions of others in the panel as competitors at several points in time. The ordered pair is the unit of analysis and we will use logistic regression.

Social Networks and International Business-to-Business Customer Loyalty

Bruce Money
University of South Carolina

This study examines whether customers who activate social network ties to find business-to-business services (e.g., banking, advertising, insurance) are more likely to remain loyal to their service providers. That is, how do differences in social network activity affect the loyalty of customers who use word-of-mouth referrals to find their service providers? For example, will a commercial banking customer or corporate tax accounting client remain more loyal if he/she found the bank or CPA firm through a network source? The effects of national culture (Japanese or American) and relative location (foreign or domestic) are anticipated and explored. Path analysis results show that those companies who use referrals switch less than those who do not. Among the three variables of number of sources consulted, tie strength, and centrality, the first two were more predictive of loyalty than the third. Also, tie strength was more important for predicting loyalty for Japanese customers than for Americans.

CP1—STDs (Martina Morris)

The Interaction of Personal Risk Taking and Network Structure: Why Hiv Does Not Propagate

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Emory University
A. Pach
NORC

In an ongoing study of urban networks of drug users in Atlanta, we have followed 157 persons in six distinct, single component networks. Two years after project inception, at least one follow-up interview has been obtained for 83% of enrollees. Sexual risk taking was high: 40 to 50 percent of respondents had exchanged drugs or money for sex; 16.1 to 63.6 percent rarely or never used condoms; men averaged from 1.7 to 8.6 sexual contacts during the last 30 days, while women averaged 4.7 to 18.7. Needle sharing was not as prominent, but still substantial: 7.7 to 16.7 percent of those who injected drugs had shared needles on the last occassion that they used; 14.3 to 21.4 percent had shared needles within the last 30 days. The six networks, however, did not display structural features that would foster HIV transmission. Sexual networks were fragmented (multiple components), with a low degree of centrality. There was a distinct paucity of microstructures (cliques, n-cliques and k-plexes). Drug networks also exhibited marked fragmentation after initial evaluation. Needle sharing, as noted, was not common, but took place within small, isolated groups, among persons who were rarely sex partners as well. Though overall HIV prevalence was 15 percent, we have documented only one seroconversion during the study. Network structure is an important determinant of disease propagation, but the interaction of risk-taking, network structure, and transmission is complex and requires continued investigation.

The Relevance of Social Network Analysis to an Understanding of Genetic Variation in HIV-1

Steve Goodreau
Penn State University

The infectious agents causing human morbidity and mortality are subject to the same evolutionary processes as their hosts (e.g. mutation, drift, selection). For microparasites, this occurs at a rate orders of magnitude higher than the host, making development of vaccines or medications difficult. In the case of HIV-1, this rate is high enough that each seropositive individual harbors a unique set of viral sequences. Investigators have sought to catalog the variant forms present in a community, but little has been done to understand how the patterns of genetic variation are generated. The answer to this question lies in combining traditional population genetics theory with social network analysis, since it is the network structure of contacts that determines the transmission of variants. This study uses microsimulation of sexual and IVDU networks to investigate the population dynamics of viral evolution. For each network, multiple runs with stochastic transmission and mutation events lead to multiple sets of viral sequences. Each set can then be grouped into a phylogenetic tree showing genealogical relationships among the sequences. The goal is to determine which parameters of the networks leave a clear signal in the structure of the phylogenetic tree.

Understanding HIV Risk Behavior Using Basic Network Measures: Empirical Results from the Baltimore Needle Exchange Program

Thomas W. Valente and David Vlahov
The Johns Hopkins University

Introduction. There is an association between a person's substance abuse behavior and that of his/her peers. Although the exact nature of this relationship is unclear, whether causal, spurious, or otherwise complex, the fact that drug consumption is often a social process leads one to study substance abuse behavior and peer interaction more thoroughly. This is particularly true in the case of drug injection behavior since the sharing of drug injecting equipment can result in considerable risk to disease of blood borne pathogens (HIV, Hepatitus, etc.). The present study uses some basic ego-centric network data to explore network covariates of HIV risk behavior. Methods. We interviewed 662 injection drug users at the Baltimore Needle Exchange Program who were enrolled in an evaluation cohort. HIV risk behavior consisted of asking respondents: whether they had used a syringe after someone else had used it (25.7% said "yes" at baseline); frequency of sharing (a) syringes, (b) cooker, (c) cotton, and (d) water summed into a scale (mean=2.1 with a maximum of 5 at baseline). These risk assessments are contrasted with those in which we asked the respondent to name his/her five closest friends and then asked wether ego engaged in four behaviors with each: (a) injected with, (b) shared syringes, (c) had sex, and (d) drank alcohol. Results. The degree of risk-taking behavior decreased as respondents had more contact with the NEP. Ego-network density was associated with injecting with friends and with drinking alcohol with friends, but not with syringe sharing or having sex with friends. Alter rank was negatively associated with riskier behaviors such that the first nominee was more likely to be one which ego shared syringes and sexual activities. Network risk behavior was higher for women than for men. Discussion. Our results are consistent with other studies that have found women in injecting drug user communities are more at risk than men. Interestingly, these results become more apparent when using network-specific measures of risk behavior rather than more general ones.

The Spatial Structure of Sexual Networks: A Case Study of HIV Transmission in Uganda

Martina Morris and Robert Ssengonzi
Penn State University

This study examines the geographic network of sexual partnerships in one of the first areas in Africa to be associated with the spread of HIV: Rakai District, Uganda. A number of theories have been advanced to explain the spread of HIV in sub-Saharan Africa as a function of population migration and mobility. In each of these theories, certain spatially mobile groups (truckers, military personnel, traders, etc.) are identified as playing a key role in the diffusion process, forming a bridge between spatially isolated populations. This study examines whether the spread of HIV into this rural district is being driven by this kind of highly mobile "bridge" population, or whether the process is instead embedded into more spatially contiguous. Two types of partnerships are distinguished in the study: spatially concordant partnerships, where both individuals live in the same location (e.g. village, parish), and spatially discordant partnerships, where partners live in different locations. This also defines a "bridge population" made up of persons who have both spatially concordant and discordant sexual relationships. We examine the mixing patterns at different levels of spatial aggregation, the factors associated with discordant partnerships, and the attributes of persons in the bridge population.

G1—Data Collection (Chris McCarty)

Estimating Transmission Bias in the Network Scale-up Method

Christopher McCarty and H. Russell Bernard
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The network scale-up method for estimating the size of uncountable populations relies on respondents' ability to report how many people they know in populations of known size and of unknown size. If people whom you know are HIV-positive, but they don't tell you about this, then: a) you know someone who is HIV-positive and b) you don't know that you know someone who is HIV-positive. We call this the transmission bias. We developed an ethnographic decision model for four populations of known size: diabetics, American Indians, twins and widowers under the age of 65. This involved asking members of these populations for the names of six people in their social networks (one each in six network categories, including a member of the family and coworkers). For each of the six alters, we asked the respondent if he or she had told the alter that the respondent was a diabetic, a twin, etc. We recorded reasons for choosing to reveal or not reveal the information. A second study is now underway to study the transmission bias more systematically. Twenty random alters will be elicited from 50 respondents who are members of various populations of known size. The 20 alters will be contacted to find out whether they know that the respondent is a member of the population.

Interpretation and Interview Context: Examining the General Social Survey Name Generator Using Cognitive Methods

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Peter V. Marsden
Harvard University

This paper reports on a small (N=50) study of how survey respondents interpret the General Social Survey's "discuss important matters" name generator. The study involved concurrent thinkaloud interviews, in which respondents were debriefed about their thought processes immediately after answering the name generator. Analyses of these responses indicate that some respondents had difficulty in specifying what was meant by the term "important matters"; sizable minorities understood the question in terms of frequency of contact or intimacy rather than in terms of specific social exchanges. Most of those interviewed said that their "important matters" had to do with personal/intimate relationships or other issues of personal life (such as finances, hobbies, or health), but appreciable numbers referred to work and political discussions. An interview context experiment revealed that a respondent's definition of "important matters" can be shaped by the substantive content of the preceding parts of an interview schedule. Notwithstanding these findings, the composition of the networks elicited in the study does not appear to vary substantially across interpretations of the name generator; this leads us to conclude that the name generator succeeds in measuring "core" discussion networks, though with somewhat nonspecific content. Implications of the findings for the measurement of personal networks in sample surveys are discussed.

Defining Social Network Size: Research Designs and Statistical Controls To Ensure Conceptual Integrity

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Fountain House, Inc.
Courtenay Harding
Western Interstate Commission on Higher Education
Charles Rodican and Kenneth Dudek
Fountain House, Inc.

The number of persons in an individual's social network can vary widely depending upon the definition of 'network' and the influence of extraneous variables. It is critical to specify network boundaries (e.g., frequency of contact or locus of contact) a priori, and to statistically control for interviewer effects, as well as interviewee gender and a variety of other background characteristics. The proposed presentation will illustrate differences in research findings obtained under varying definitions of 'network' and with gender and interviewer effects both controlled and uncontrolled. The presenters will then suggest practical methods for routinely coping with these threats to internal validity in the analysis of social network data. The data to be presented are from a randomized controlled comparison of two mental health service interventions (PACT and Clubhouse). The project (Employment Intervention Demonstration Program) was funded by the federal Substance Abuse and Mental Health Services Administration (SAMHSA) and is now in its fourth year. The social network instrument used in the project is the Star Chart, updated by Drs. Macias and Harding, but originally designed in collaboration with John Strauss, MD for the Yale University longitudinal study of schizophrenia.

P1—Complexity (Barry Markovsky)

Economically Grounded Dynamic Networks: An Agent Based Simulation Model of Network Formation

Norman P. Hummon
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This paper presents an economically grounded agent based simulation model of network formation. Simulated actors make rational choices using a utility function proposed by Jackson and Wolinsky (1996) that accounts for the costs and benefits of forming ties and being a member of a network. The model explores different tie formation conditions, and variations in the utility function. These models attain interesting equilibrium network structures. Under some conditions, the networks are null, under others they are complete, and under a third set of conditions the networks are star configurations. These results suggest some interesting additional speculations about the nature of social hierarchies.

The Effects of Actor Choice on Network Structure: A Cellular Automata Simulation

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In the study of social dilemmas it has been found that the availability of a third choice, not interacting, in addition to the usual two choices, cooperation or defection, can increase rates of cooperation. Cooperators may choose to cooperate only with each other, and habitual defectors can be excluded from any profitable transactions. In social psychological studies of exchange networks, the network of exchange possibilities has been unalterable by the actors. Differences in exchange opportunities lead to power differences. However, what would happen to these power differences and to the network if actors could leave unsatisfactory positions to search for new and more satisfactory ones? In a simulation using cellular automata, actors bargain to maximize their rewards within a fixed exchange network. However, if they are unsuccessful, they may leave their current positions and roam over a space in search of new partners. This simulation is used to explore the conditions under which the possibility of leaving unsatisfactory positions reduces power differences, and the shapes toward which exchange networks evolve.

The Complexity of Social Networks: Theoretical and Empirical Findings

Carter Butts
Carnegie Mellon University

A great deal of work in recent years has been devoted to the topic of "complexity," its measurement, and its implications. Here, the notion of algorithmic complexity is applied to the analysis of social networks. Structural features of theoretical importance - such as structural equivalence classes - are shown to be strongly related to the algorithmic complexity of graphs, and these results are explored using analytical and simulation methods. Analysis of the complexity of a variety of empirically derived networks suggests that many social networks are approximately as complex as their source entropy, and thus that their structure is in line with the conditional uniform graph distribution hypothesis. Implications of these findings for network theory and methodology are also discussed.

TL2—Methods (Pip Pattison)

The Plurality of Civic Relations: Publics, Projects, and Social Settings

Ann Mische
Columbia University
Philippa Pattison
University of Melbourne

In this paper, we use the algebraic technique of "Galois" or "concept" lattices to analyze the sociocultural dynamics of social settings. This method allows for the representation of social settings as complex interpenetrations of individuals, organizations, and discursive forms over time. We apply this method to the analysis of the convergence of organizations and projects at public events in the 1992 Brazilian impeachment movement. First, we propose that k-partite graphs constitute a useful base from which to explore interdependencies among different classes of social entities (e.g., organizations, projects, and events). In doing so, we extend bipartite (Breiger, 1974) and tripartite (Fararo & Doreian, 1984) representations of the relations among multiple sets of associated elements. We show how concept lattices (e.g., Ganter & Wille, 1992; Wille, 1996) may be used to represent important features of the interpenetration of these multiple types of social entities. We apply this analysis to three major stages in the development of the Brazilian impeachment movement, as the movement moved from initial sectoral segementation toward a civic convergence.

Tips for Creating a Lot of Random Stress

Ken Sturrock and Jorge Rocha
University of Florida

During the 1960s and 1970s a number of articles were published describing multidimensional scaling (MDS) and various aspects of this technique. A number of these papers explored the evaluation of MDS stress by creating randomly generated MDS diagrams and describing the distribution of the stress values. Unfortunately, these early papers were limited by the amount of computational power available at the time. We (Sturrock & Rocha) utilized a RISC based UNIX cluster to generate several hundred thousand random MDS diagrams and have attempted to further explore the boundaries of MDS stress. We hope to better define acceptable stress limits for a series of MDS diagrams. Details and initial results will be presented.

Computer Expert System MAKS 3.0 for Analysis of Social Networks

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Russian Academy of Science

Today system analysts and sociologists need the powerful instrument to analyze and diagnose varied social-economic systems, forecast their behavior, compare different systems and trace their change. One of the few methods for deciding this problems is a module analysis, which methods do not depend on the nature of systems under investigation and allow, unlike methods of classical statistics, forecast a system behavior and select cycle processes on the base of single data array. In 1996-1997 the author developed computer expert-diagnostic system MAKS version 3.0 for analysis and modeling of social networks on the base of theory of module analysis. This allows to analyze variable structure systems, take machine simulation experiments on the scheme "what if", show a system transformation mechanism and their structured-functional regularities, forecast their behavior in the future, take quantitative and qualitative analysis. MAKS is an universal system, which can analyze and compare heterogeneous information and does not require teaching before the beginning of its work. MAKS was successfully used in a number of studies, such as, the possible scenario of Russian way out from the crisis, the optimum structure of Russian economy and army forces, the analysis of crime structure in the world.

A2—Inter-Organizational (Bruce Money)

Influence and Innovation within the Business Community: Who Does an Elite Organization Emulate?

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Center for Advanced Study in the Behavioral Sciences and Cornell University
Mary C. Still
Cornell University

We consider how inter-firm reputations and relationships help guide innovation at a large global financial services corporation. We use individual- and group-level data on 24 cross-cultural teams to examine the influence of nearly 200 benchmarked corporations on team recommendations for transforming work practices, systems and corporate culture of the focal company. We analyze the degree to which the influence of benchmarked organizations is based on their size and profitability; their overall prestige within the business community; their reputation within the specific domain being benchmarked; and their network linkages to the benchmarking corporation.

Individualism-Collectivism, Trust, and Cooperation: A Networks Perspective

Mourad Dakhli
University of South Carolina

Trust has long been recognized in the organization literature as an important determinant of exchange relationships among individuals, groups, and organizations. Research in this area also suggests that trust is not a uni-dimensional construct; rather, various forms of trust relationships exist, and different forms lead to different types of cooperation. In this study, we use a network analysis approach to study the relationship between trust and cooperation for a group of collectivists and a group of individualists. We first compare, the networks of cognition-based and affective-based trust relationships in both groups. Than we test the proposition that affect-based trust relationships are stronger predictor of cooperation among collectivists, while cognition-based trust relationships are more important predictor of cooperation among individualists.

Where Do Interorganizational Exchange Networks Come From? The Emergence of Intercorporate Exchange in Chinese Business Groups

Lisa A. Keister
UNC, Chapel Hill

This paper takes advantage of the dramatic reorganization of exchange relations that accompanied Chinese economic reform to investigate the effects of environmental uncertainty, firm reputation, and resource cost on the structure of interorganizational resource exchange networks. The paper aims to understand not just the structure of exchange networks among Chinese organizations but also the processes that lead to the emergence of repeated interorganizational exchange relations more generally. Consistent with exchange theory, I find that organizations seek to reduce uncertainty by creating exchange relations with those that have secure access to scarce resources. Consistent with research on social dilemmas, organizations exchange with familiar others, particularly when the focal firm is highly profitable and the organizations are exchanging financial resources. Contrary to the expectations of a pure rational actors model, however, firms are willing to pay higher costs for the resources they need in order to maintain relations with others whom they trust.

CP2—Family/Social Support (Jill Suitor)

Gender, Social Support, and Experiential Similarity During Chronic Stress: the Case of Family Caregivers

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Karl Pillemer
Cornell University

The literature on gender and social support demonstrates that women are substantially more likely than men to both solicit and receive support--particularly emotional support--throughout the life course. In the present paper, we draw on our previous work on experiential similarity to argue that there are particular conditions under which men and women are equally likely to both seek and receive social support. To examine these issues we use data from 316 women and 85 men caregivers to elderly relatives with dementia, and 4,518 members of their social networks. Both the quantitative and qualitative analyses revealed that experiential similarity was much less important in explaining men's than women's patterns of support. Experiential similarity may be less important for men than women because women place greater emphasis on understanding others' experiences than do men, particularly in relation to one's own experiences. An alternative explanation may be that while men solicit support primarily from their wives, women draw from a wide range of sources; therefore, women need to develop selection criteria for soliciting such support. Thus, for women, experiential similarity may facilitate successfully "filtering" their network in an effort to ensure access to the most empathetic members. For men, there may be no such selection processes.

Exploring The Structural Contexts Of The Support Process: Social Networks, Social Statuses, Social Support, And Psychological Distress

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Jeanne S. Hurlbert and John J. Beggs
Louisiana State University

Despite the long-standing interest of sociologists in the impact of social structure on the psychological well-being of individuals, the structural contexts of the support process remain understudied. To being to fill this gap, some support researchers have used social statuses to tap location in the social structure. Others have analyzed the interpersonal environments in which individuals are embedded by using quasi-network data that describe categories of alters or, less commonly, network data that are linked to specific alters. After making the case for network data, we develop and test models that examine direct effects of network structure on perceived adequacy of social support and their direct and indirect effects (through social support) on psychological distress--net of social status effects. Because we find evidence for these effects, our results suggest that the social network context is more important in the support process than researchers using quasi-network data have concluded. Then, for both outcomes, we investigate the possibility of joint effects of the social network and social status contexts by testing for gender-specific effects of network structure. We find only limited support for arguments that network structure may affect the perceived adequacy of social support or the psychological well-being of men and women in different ways or to different degrees. We conclude by arguing that the role of the social network context in the support process will become clear only when its direct, indirect, and joint effects are considered.

The Impact on Substance Abusers of Supportive and Impedimental Social Networks

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Sébastien Reichmann,
LASMAS/Centre National de la Recherche Scientifique
Veerle Soyez,
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The European project Biomed II/IPTRP: Improving Psychiatric Treatment in Residential Programmes for Newly Dependent Groups through Relapse Prevention: A Multi Centre Trial started in 1996. The project is financed by EC and includes ten participating countries. As one part of the project, drug and alcohol dependent persons were interviewed at intake to treatment using two different instruments: the Addiction Severity Index (ASI) and the Maastricht Social Network Analysis (MSNA). ASI is a semi-structured interview that offers a multidimensional profile of the interviewee by covering problem areas or dimensions (medical, employment, alcohol, drugs, legal, family/social, psychiatric) most often associated with substance abuse. Within several of the dimensions, variables measuring aspects of personal networks are found. MSNA is an interview that aims at mapping the composition of a personal network and the quality of the ties between the ego and the network members. The present paper presents some preliminary findings concerning the importance of including social network data in the diagnostic instruments used for assessing the client's problem severity status. Data from three of the participating countries are used in order to compare the network measures of ASI and MSNA. Network measures and their association with characteristics of substance abuse and psychiatric status are also investigated. This research was supported by the European Commission DG XII, BIOMED contract no: BMH4-CT96-0688.

G2—Data Collection (Chris McCarty)

Some Characteristics of Ego-centered Networks in Nyanza Province, Kenya: Accuracy of Ego Reports, Reciprocity of Nomination, and Stability of Networks over Time

Kevin White and Susan Cotts Watkins
University of Pennsylvania

In this paper we take advantage of an unusual data set on egocentric networks in rural Nyanza Province, Kenya. The data set includes two waves of a household survey and a set of semi-structured interviews and focus groups. The household surveys were conducted in four sites in 1994/5 and 1996/7, with a sample of approximately 933 women and their husbands. Critical to the use of ego-centered network data is the accuracy of ego's reports about his or her alters. In one of our sites, we were able to link many of the network partners with their alters and thus to compare ego=s reports of the characteristics of her network partners with the alters= own reports of their behavior and to examine reciprocity. The longitudinal nature of our data permits us to examine the stability of networks over time. We find that ego=s reports about her alters and alter self-reports agree fairly well on those characteristics that are easily observable (children, metal roof). There was moderate agreement on less obvious possessions, such as a lamp or radio, and education, a highly prestigious personal trait that is likely to be fairly well known to others. A typical finding in the few network studies that relate the ego's behavior is correlated to the behavior of his/her alters, leading to inferences that networks influence an ego to adopt family planning or to the suggestion that ego's may be projecting their own behavior onto their alters. We find the familiar cross-sectional relationship between ego's contraceptive use and the alters' contraceptive use as reported by the ego. However, this relationship vanishes when we compare ego's self-reported use to alter's <u>self-reported</u> use. Thus, it appears that there is a significant amount of projection by egos onto their alters. In small rural communities one might expect networks to be rather stable over time. We also would expect reciprocity to be 100%, given our name enumerator question: if ego chatted with alter, then alter chatted with ego. We find little stability, however, in the particular people who are named as a member of ego=s family planning network over the two years between the two rounds of our household survey, but more stability in the characteristics of the network partners. Reciprocity is low--20%. Our findings on reciprocity and stability lead us to suggest that actual conversational networks may be large and conversations often casual, thus leading to selective reporting of the chats and/or to considerable forgetting of network partners.

Assessing Validity of Network Items Through Partner Collaboration

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Network studies depend on the accuracy of respondent descriptions of their relations with others, especially in cases like the estimation of HIV transmission networks where sexual behavior and drug use behavior (especially drug injection) involve issues of social desirability and embarrassment as well as of accuracy of recall. In spite of these concerns, there has been general acceptance of survey descriptions of sexual behavior and drug use. However, even when there is little concern about the accuracy of individual-level data on sexual and drug use behaviors, network studies require a higher level of accuracy. In a study of drug use social networks, 169 focal individuals (126 chronic, heavy drug users and 43 non-drug-users) described their risk networks (sex and drug injection partners). Of these 169 respondents, 119 described risk relationships with partners who were subsequently interviewed. This study describes the consistency of relationship reporting between the two parties in three domains: sexual behavior in the previous 30 days, joint drug use behaviors in the previous 30 days, and qualities of the relationship such as connection, closeness, and trust.

Exploration of Validity Issues for Ego-centered Networks: The Bolivia National Reproductive Health (NRH) Campaign Case Study

Fannie Fonseca-Becker and Thomas W. Valente
The Johns Hopkins University

Assessment of validity is essential when using ego-centered network data. However, there appears to be some confusion in the literature regarding the definition of validity. Often the terms validity and reliability are used interchangeably, even though they represent separate and distinct measures of the degree to which an empirical indicator represents a theoretical concept. This paper 1) clarifies the concept of validity in network studies and, 2) develops indirect methods to test the validity of network data. Ego-centric data were collected from women and men 15-49 years of age in two cross-sectional urban probability samples (n=4620), by asking the respondents to name up to five persons with whom they discussed matters of personal interest. Proportion of kin that know each other was used as one of the indirect measures of validity. Preliminary results indicate that 94% of alters that are kin reported knowing each other. Given the constraints of conducting observational studies to validate ego centered network data, indirect techniques on representative samples are a good alternative for validity assessment.

P2—Language and Information (Roberta Chase-Borgatti)

Information Propagation Within Social Networks of Seropositive People

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We know remarkably little about the process by which people pass items of information among one another. In this paper we seek to explain how people choose what information to tell others about themselves. We use data collected on a survey of seropositive individuals by Shelley et al. (1995),which asked informants whether they knew various items of knowledge about their network members, and vice versa. These items range from something which could possibly be easily known (e.g. real first name, marital status, occupation) to something more difficult to know (e.g. political party affiliation, HIV status, blood type). Characteristics of both informant and alter affect what people know and how much they know about one another. We examine the patterns of this knowledge, and seek to explain it with a variety of approaches including decision trees.

Taking Turns and Talking Ties

David Gibson
Columbia University

In management discussions, speaking turns are a coveted resource. How they are allocated is consequently an important question, one that assumes a network dimension once we recognize that actors allocate (and deny) turns to one another. The analysis of network effects on turn-allocation involves two steps. First, conversational data must be summarized in matrix format. Traditional who-to-whom matrices are judged inadequate, as a result of their failure to incorporate conversation-analytic insights into the sequential production of talk, so an alternative approach is developed that does this. Second, the conversational matrices and questionnaire-based network matrices must be conjointly analyzed, but inter-matrix correlation is inadequate due to sequential constraints reflected in the turn-allocation matrices, which obfuscate simple correlations. Random graph models, which identify frequently occurring substructures, are consequently employed. Initial findings suggest that (a) conversational obligations resulting from dyadic network ties implicate third parties, and (b) in enacting network ties, actors are more concerned with exploring oppositions than with enabling friends to speak.

Sociometric Graphings of Portuguese-based Creoles in West Africa, from Socio-lexical, Socio-syllabic and Socio-phonetic Perspectives

Steve Graham

The paper provides a social network analysis of Portuguese-based Creoles in West Africa at the socio-lexical, socio-syllabic, and socio-phonetic levels. The research hypothesis suggests a direct correlation between lexical tender and social network identity. The analysis examines 169 lexical relationships between 29 actors through lambda sets analysis, CONCOR analysis, tabu search analysis, hierarchical equivalency clustering analysis, and multidimensional scaling analysis. The resulting sociometric graphs, at the socio-lexical, the socio-syllabic, and the socio-phonetic levels, suggest five social networks in the data. The conclusion suggests that the socio-syllabic level may be a questionable construct in marking social network identity, or that it may be a feature of another level. However, the conclusion also suggests that the socio-phonetic level may be the strongest level in marking social network identity, and that the socio-lexical level may be a rather weak or loose level, and therefore flexible and open to lexical enrichment, (or relexification?). Ongoing research questions in the close of the paper also suggest that some social network analysis graphs may help represent the possibility of a multidimensional perspective for the post-creole continuum, the possibility of a social network typology for Creole languages, and the possibility of using social network analysis to provide clustering information between a Creole and the substrate candidates.

TL3—Interorganizational (Martin Gargiulo)

The Social Side of Creativity: A Social Network Perspective

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For employees in today's highly competitive and somewhat erratic business environment, the ability to come up with unique, yet appropriate approaches to work assignments can be an important advantage. Researchers have acknowledged this important dimension by investigating the influence of a variety of contextual factors on creativity at work. However, a relevant and pervasive contextual feature, social relationships, has only been minimally addressed in creativity theory and research. This paper addresses this oversight by exploring the association between the context of social relationships and creativity. Concepts from various social network and creativity scholars are integrated to explain how various features of social networks may influence creative activities. Specifically, it is proposed that individuals with a larger number of instrumental relationships are likely to have higher creativity. In addition, centrality in instrumental networks is expected to relate favorably with individual creativity and is expected to be a greater predictor of creative work than the number of instrumental ties. Lastly, network boundary is considered and several propositions are developed relating network boundary, relationship type, structural properties, and creative outcomes.

Network Structure and Network Content Of Social Capital as Predictors of Knowledge Creation

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Although there has been a burgeoning of social capital research in recent years, the dependent variables of this literature remain mostly restricted to individual promotion and job seeking. In contrast, this paper employs social capital to predict knowledge creation and innovation. In particular, the dependent performance variable indicates a project group's effectiveness in creating knowledge in the form of innovative processes and products. The paper examines the social capital dimensions of network structure (dense networks vs. those with structural holes), and network content (personal and reporting relationships) as antecedents. It argues that the effectiveness of knowledge creation is positively associated with: 1) non-redundant knowledge ties between the project group and other organizational sub-units; and 2) the density of cognitive and interpersonal ties among group members. The resources accessed via the group's social capital are the market and technical knowledge that are prerequisites to knowledge creation. In making these points, the paper takes the position that Burt's structural hole theory, emphasizing bridges among sparse networks, and Coleman's "closure" theory, stressing cohesive ties in dense networks, are not competing theories. Rather, these opposite views on how network structure creates social capital are alternate theories whose applicability depends on network content as well as outcomes predicted. Each theory applies to a different step of the knowledge creation process.

The Application of Network Analysis to the Study of Differentially Effective Schools

Maryann M. Durland
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This paper summaries the results of a Network Analysis study of differentially effective schools based on a school effectiveness and school improvement perspective (SESI). The goals and design were: 1. define the conceptualizations for structural characteristics (i.e. the leadership of the principal, the cohesiveness of the faculty, the overall faculty network pattern, and clique and cluster patterns) based on a review of SESI research supporting specific conceptualization; 2. describe the CCMSE, which organized the conceptualizations into a research model; and 3. summarize the methodology and study results. Resultsinclude (a) comparisons of measures for differentially effective schools within the CCMSE model; and (b), an analysis of other structural characteristics of sociograms, on both quantitative measures (i.e. number of network components and k-plexes) and qualitative dimensions. This study was based on two propositions about effective schools, 1. Schooling is a complex interactive social process which can be conceptualized as a structural model of interactions. 2. Many of the characteristics associated with effective schools describe relationships or are the results of relationships associated with communication structures. Results indicated that there are mean differences on some measures for differentially effective faculty networks, schools classify as expected on the CCMSE model and that sociograms illustrate key differences in dimensions such as the location of leadership and overall structural characteristics between differentially effective schools.

A3—Methods (Vladimir Batagelj)

Finding Status in Structured Clustered Data: Using Log-linear Models

Eric Rice and Elisa Jayne Bienenstock
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Building on the work of Han and Breiger (1998), Breiger and Ennis (1997) and Breiger and Roberts (1998) we use log-linear models to find and distinguish several layers of hierarchy in our data. Our data is scores from the first 7 games of the 1998 season of the National Football League. The rows represent the number of points a team has scored; the column represent the number of points the teams defense allowed the other team to score. Parameters from log-linear analysis allow us to determine which teams should win in dyadic competition. Additional parameters allow us to predict which should dominate the league. Adding conference membership as a variable allows us to add a further dimension to the discussion. The Tau parameter will inform us of the rankings of conferences relative to one another, while the alpha and beta parameters in this multi-level analysis tell us about the internal hierarchy within each conference. This data illustrates the relation of the structural parameters to ideal data. Sociological data will likely have more error and be more complex than football scores.

Models for Systems of Ranked Clusters as Networks

Patrick Doreian
University of Pittsburgh
Vladimir Batagelj and Anuska Ferligoj

This paper presents two new developments for partitioning networks. One is a symmetric-acyclic decomposition of networks and the other is a generalized blockmodeling approach to establishing such decompositions of networks. Both are founded on the Davis and Leinhardt (1972) formulation of a ranked clusters model as a theoretical expectation concerning the structure of human groups and directed affect ties. This model - as either the decomposition or the generalized blockmodel - can be applied in a variety of contexts. We illustrate this with some children networks and the marriage network of noble families in Ragusa (Dubrovnik) for the late 18th and early 19th centuries.

"Social Process and Hierarchy Formation" (I.D.Chase 1980): Theoretical Concepts Confirmed, Data Analysis Revisited

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Wolfgang Sodeur
University of Essen

In his often cited article (ASR 45, 1980, p.905-924) I.D.Chase tries to explain the formation of hierarchy among chickens. He defines two levels of analysis:(1) "Long-term processes": Sequential establishment of stable dominance relationships among pairs of chickens. Hierarchy will be guaranteed only if transitive dominance patterns among any three chickens (triads) develop. Depending on which two out of three dominance relationships in each triad develop first, either future transitivity will be assured in any case or will depend on the third dominance relationship. (2) "Short-term processes": Aggressive acts of individual behavior among pairs of chickens. I.D.Chase proposed to explain the long-term process indirectly by short-term processes. He looked for behavioral or reactional regularities which possibly direct the long-term process and assure hierarchy by the constitution of dominance relationships in a special sequence. In the empirical analysis, however, this clearly stated separation of processes was lost because aggressive acts were aggregated over the whole observation period. We re-analyzed (simulated) data, found different results, and in turn propose different explanations. While the (short-term) sequence "Double Attack" originally seemed to be the cause of hierarchy formation, it now will be interpreted as the consequence of established (long-term) relationships "Double Dominance".

CP3—Diffusion & Science (Christophe Van den Bulte)

Medical Innovation Revisited: Is Social Contagion All It's Cracked Up to Be in New Product Diffusion?

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University of Pennsylvania
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Pennsylvania State University

Recent studies in marketing have cast doubt on the dominant role of social contagion in new product diffusion. In the light of these findings, we re-assess what is considered among the best evidence of social contagion in the diffusion literature: the Medical Innovation study by Coleman, Katz and Menzel on the diffusion of tetracycline in the mid 1950s. A descriptive analysis of the tetracycline market suggests that pharmaceutical companies' marketing efforts, rather than social contagion, is likely to have played a dominant role in the diffusion of tetracycline. We formally test this alternative account by estimating a discrete-time hazard rate model incorporating both lagged network autocorrelation variables and advertising. The main substantive finding is that evidence of social contagion reported in some earlier analyses of the Medical Innovation vanishes once one controls for marketing effort. Note that the analysis is based on a single-stage adoption model. Descriptive statistics in the original analysis by Coleman et al., however, suggests that advertising had a larger effect at the awareness stage, while networks were more influential at the decision stage. We are developing a two-stage hazard model to assess this richer "compromise" explanation.

The Institutionalization of Science: Networks of Geneva Scientists in the 16th-19th Centuries

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The development of Science has often been considered a function of individual merit or genius. From this perspective, Science is the product of isolated individuals, regardless of their social or family relations. In this paper, we cast doubt on this idea by showing that the institutionalization of Science can be better understood as a social process, embedded in networks of relations. Focusing on kinship and marriage ties, we hypothesize that the institutionalization of Science emerged historically in relation to complex patterns of matrimonial alliances. Geneva (Switzerland) has been a scientific center for the last few centuries. Prior research (Montandon, 1975) has suggested that many Geneva scientists were related by blood or marriage. Using our newly collected dataset, which includes 105 Geneva scientists from 32 families over 3 centuries (16th-19th centuries), we employ recent advances in network methods (White, 1997) to visualize the kinship network of Geneva Scientists and to measure correlations between marriage patterns and the institutionalization of Science. We demonstrate that a strong tendency toward matrimonial relinking (Brudner & White, 1997) among families of scientists existed, and that the institutionalization of science as indicated by increasing scientific specialization, the emergence of academies and scientific associations, and the development of scientific publications depended, in large part, on these relinking patterns.

G3—Collective Action (Geoff Tootell)

Exchange Network Theory Applied to Collective Decision Making

Marcel van Assen and Frans Stokman
University of Groningen
Dave Willer
University of South Carolina

The Collective Decision Making model of Stokman and Van Oosten (1994) assumes that actors in a collective decision making situation influence each other by bilateral exchanges of voting positions. It is thereby assumed that exchange rates are independent from network structure. However, both theoretical and empirical research on exchange networks in a private good context has shown that exchange rates in bilateral relations do depend on the network structure in which these relations are embedded. In this paper exchange network theory is applied to a public good context, collective decision making. But instead of modelling exchanges as a division of a common resource pool, the original exchange formulation is used. Using Exchange-Resistance theory, the collective decision model of Stokman and Van Oosten, and game theory, a number of results are derived. First, for isolated bilateral exchanges, the exchange rates as predicted by Exchange-Resistance theory are proved to be equal to the Raiffa-Kalai-Smorodinsky solution from game theory. Second, using exchange network theory and game theory it is derived that exchange rates of collective goods can be very different from those predicted by the model of Stokman and Van Oosten.

Collective Action And Countervailing Power

David Willer
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In previous network exchange research, only positions which exchange have been allowed to communicate, blocking collective action. This research allows peripheral actors to communicate and organize collective action. All networks studied had one central position exchanging with six peripherals who could not exchange with each other. We seek to predict the effect of collective action under four contrasting types of connection. For example, when exclusively connected, the central position excluded two of six peripherals. As long as peripherals were isolated power developed such that the central position gained effectively all resources. Allowing low power peripherals subsequently to organize and act collectively countervailed power such that resources were divided evenly. By contrast, when no peripheral was excluded, power differences did not develop and, as predicted, coalition formation had no effect on exchange ratios.

P3—Drugs (Russ Bernard)

Estimating Heroin Use in the General Population by Means of a Network Scale-Up Method

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Estimating the proportion of the population who use "hard" drugs such as heroin is difficult. Users are estimated by scaling persons who are"caught" by organized systems: jails, hospitals, and the like. This method is biased because people who come to the attention of "authorities" differ from those who do not. Epidemiological surveys are biased by the unavailability of hard core users as well as by their reluctance to admit to drug use. A third method uses "network scale-up." As applied here, 5,490 respondents in 12 cities were asked how many people they knew who had their homes broken into, were attacked, were robbed, had their cars stolen, who binged (five or more drinks on one occasion), who used marijuana, or who used heroin. FBI Uniform Crime Reports statistics were processed for these cities. Except for auto theft, the survey asked whether the respondents were victimized and whether they themselves used the substances. Network scale up tended to match survey reported rates of binging, and UCR rates of vehicle theft, to underestimate survey rates of robbery and assault and roughly to double rates of reported marijuana use. Reported heroin use in the survey averaged .50 percent for 12 cities; the network scale-up averaged 2.89. Biases introduced by discrepancies between UCR rates and survey victimization rates, by the stigma of the behavior and by the circle phenomenon that "it takes one to know one" are analyzed.

Modeling Evolving Drug Networks

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In modeling an evolving, illegal drug dissemination network, I recognize the key participants as drug users, dealers, and suppliers. Using a constructural model of interaction, virtual groups of participants disseminate drug-related information and influence peers on illegal drug usage. Evolving communication networks for each time point are obtained by dichotomizing at the mean probability of interaction. Preliminary results show that the path length between the users and suppliers (i.e. a proxy for cost of merchandise) is highly sensitive to knowledge and demographic distribution of end groups (i.e users and suppliers) and less so to those distributions of the mediating group, or in this case, dealers. In other words, the reachability of the original seller to the consumer is least dependent on properties of the dealer. Reciprocity and both out- and in-degree centralizations in communication seem sensitive only to user properties (i.e the knowledge and demographic distribution) and their non-reluctance to use drugs. The effects of dealer properties become apparent only when groups reach higher levels similarity. That is, mediating groups affect network properties only when rate of homogeneity or similarity begins to decrease. Analyses also include aging populations and drug disuse.

Personal Drug Use Network Correlates of Hiv, Hepatitis B and Hepatitis C Infection among Non-injecting Heroin Users

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Objective: The composition and structure of non-injecting heroin users' (NIUs) personal drug use networks may be associated with the risk of infection with HIV, hepatitis B (HBV) and hepatitis C (HCV). We compare the drug use personal networks of NIUs who are: (1) HIV seropositive; (2) HIV seronegative but seropositive for either HBV or HCV; and (3) seronegative for all 3 viruses. Methods: 560 NIUs were recruited out-of-treatment in NYC between March 1996 and April 1998, pre-test counseled and tested for HIV, HBV and HCV antibodies. In privately conducted structured interviews

they were asked to list members of their drug use, sexual and support networks in the prior 30 days and were asked about members' characteristics and their relationship and risk behaviors with these members. Differences in network composition and structure are examined using analysis of covariance, controlling for respondent's age and prior history of injecting. Statistical significance is $p < 0.05$. Results: 386 (28% former injectors; 72% never injected) respondents provided information on 1 or more drug use network members. At baseline, 43 respondents (11%) were HIV seropositive, 172 (33%) HIV seronegative but seropositive for either HBV or HCV, and 214 (55%) seronegative for all 3 viruses. The personal drug use networks reported by respondents who were HIV seropositive (category 1), compared to those in categories 2 and 3, included higher percentages of members who were: current or former injection drug users (IDUs) (33% vs 20% and 25%), HIV positive (15% vs. 2% and 4%), 30 years of age or older (77% vs. 66% and 56%), and Latino (44% vs. 40% and 27%), a smaller percentage who were white (20% vs. 26% and 38%), and were reported to be of smaller size (2.9 drug use members vs. 3.6 and 4.0). Conclusion: The composition and structure of NIUs' personal risk networks may be associated with an increased risk of infection with HIV, HBV and HCV. The relationship between the composition and structure of personal drug use networks and the transmission of these viruses needs further research.

TL4—Intraorganizational (Martin Gargiulo)

Informal Networks and Third-Party Cooperation

Martin Gargiulo
INSEAD

Existing research emphasizes how informal networks can promote mutual trust and understanding between interdependent managers, helping them overcome the social dilemmas of cooperation. Yet, network theories of control suggest that informal ties can also have an important role in helping managers to prompt cooperation between third parties in their task environment. By enhancing their ability to coordinate their behavior, informal ties help managers pose concerted demands on third parties, increasing pressures to cooperate for reluctant players and reducing behavioral uncertainty for cooperative ones. Evidence from thirty-eight project teams within the Italian subsidiary of a multinational computer firm shows that the level of informal communication between the managers responsible for facilitating cooperation in those teams significantly increased the probability of cooperative behavior between other team members.

The Concurrent Impact of Internal & External Ties on Group Performance

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Kurt Dirks
Simon Fraiser University
Russel Rogers and Norman Chervany
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This paper posits that social networks both internal and external to a group play a pivotal role in group performance. Prior research has examined intra group dynamics and external group relations independently. Findings indicate that interpersonal relations among group members and boundary spanning functions within a group both play in important role in group performance (Guzzo & Shea, 1992; Gladstein, 1984). We suggest that the performance implications of internal and external group networks are highly interdependent. Friendship, advice and trust networks may be instrumental in enhancing a group's ability to work together, while external networks may be essential in obtaining critical information and resources. Groups with strong internal group dynamics with limited external ties may fail to gain access to critical information while those with strong external ties and poor internal network structures may fail to assimilate critical information. In this paper we investigate the concurrent impact of both internal and external network ties on MBA group performance. Data for this study was collected during the course of a quarter in which all first year MBA students were assigned to teams that participated in a computerized business simulation.

Network Structure Among Task Group Members and Group Performance

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Sociologists and management scholars increasingly recognize the importance of employing network analysis to understand organizational phenomenon. One such example is the use of task groups within organizations. This study explores the relationship between network factors and task group outcomes including group member satisfaction and group task performance. The study includes network and demographic survey data on a population of 70 fully-employed MBA students at a major university in a first-year core academic course. In the course, students had been divided into work groups responsible for producing a major written assignment near the end of a term. We surveyed the students twice: once at the beginning of the term, and again on the assignment due date. Thus, in addition to treating the relationship between network factors and group outcomes, our analysis provides a perspective on how network factors develop over time within this population. Specifically, we examine the relationship between the structure of advice and friendship networks and two outcomes: group performance and group member satisfaction. Our analysis includes an assessment of how group network factors developed over the duration of the groups' task.

The Network Structure of Reputation

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The paper is about the roles that networks play in establishing a reputation. The concept of reputation in economic sociology is analogous to the colloquial image of being trustworthy. People with a positive reputation are expected to behave well and producers with a positive reputation are expected to deliver a high quality product, perhaps a tad expensive, but "worth" the price. People with a negative reputation are expected to behave poorly and producers with a negative are expected to deliver low quality product or no product; in either case, your resulting displeasure is met with "What did you expect?" Given the uncertainty of markets and personal relationships, reputation is a signal of trustworthiness. That signal has effects in ways Merton (1968) brought together under the rubric of a "Mathew" effect. One's past accomplishments affect the probability of getting credit as responsible for future accomplishments. Economists have theory and empirical results on the value of reputation (e.g., Gorton, 1996, shows that the debt of new banks just before the Civil war was discounted more heavily than otherwise similar banks in the same period and location, and the discount declines over time as the new banks become reputable). What is not known, and what has significance for analyzing reputation effects, is how reputations are produced. Being known for one's past behavior as a signal of one's future behavior is inherently a social phenomenon. Network theory offers two production mechanisms, one global the other local. I bring the two production mechanisms together in this paper to assess their relative importance for the reputations of officers in a large financial organization.

A4—Methods
(Pat Doreian)

Exploring the Measurement of Centrality

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There are different approaches of definitions and interpretations of the measurement of Centrality in sociology. Three of those approaches are discussed in this paper. Freeman's (1979) Degree-based Centrality is based on the intuitive conceptions of the graph theory and is not network-weighted. In addition, there might be flaws in the commonly accepted definitions and formulas regarding the Closeness and Betweenness Centrality. Friedkin (1991) introduced his approach based on the theory of digraphs and Markov chains. In his work, the Total Effects Centrality (TEC) turn out to be similar to the Degree-based Centrality of Freeman's. The measurements of Immediate Effects Centrality (IEC) and Mediate Effects Centrality (MEC) are the direct application of the "Regular Markov Chains Theory" with possible limitations in the interpretations and required conditions. In another approach, Bonacich (1987) proposed a generalization of the concept of Centrality from exchange networks, and gave c(alpha, beta), a family of Centrality measurements. Further reasoning and specifications regarding the measurement c family are needed. This paper tries to integrate the above approaches together on a single model - the general Spatial Autocorrelation Models (SAM). Each of the above has relation to one of the specifications of the SAM model. The details of the relations are revealed in the paper.

Ego-Network Betweenness

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Carnegie Mellon University

There are many examples of studies that use ego-networks. An important question is what information can be determined from the ego-networks about the whole network. A proper statistically rigorous answer to this question is often beyond the bounds of our current knowledge. Centrality is one of the most important concepts in social networks. Clearly we can determine the degree centrality from the ego networks but the other centrality measures are more elusive. Closeness, eigenvector and information centrality all clearly depend on the whole network and it is most unlikely that ego networks will be able to shed much light on these measures. Betweenness falls rather between the two extremes. In this paper we examine ego-centred betweenness and show how it can be easily computed. In addition we present the results of a simulation which indicates the relationship between the local bewteenness of ego centred networks and the betweenness in the network as a whole.

Heterogeneity of Degree

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In "Why Your Friends Have More Friends Than You Do," Feld showed that the mean number of "friends of friends" is always higher than the mean number of friends as long as there is any variation in the numbers of ties among individuals. However, we have come to recognize that experiences of inequality and other important consequences derive not only from variation in degree but also from the heterogeneity of degree. Heterogeneity of degree (H) is defined as the extent to which people are tied to others with different numbers of ties from themselves, and measured as the mean value of xa/xb for all ties, where xa and xb are the degrees of the individuals at each end of a tie. For the same amount of variation in degree, heterogeneity of degree is minimum when ties connect people with equal numbers of ties, and is maximum when ties connect people with maximally different numbers of ties. We derive a normalized measure that varies from -1 to +1 to indicate the extent to which individuals are tied to others with degrees more or less similar to themselves than would be expected by chance. We consider implications of H for the experiences of individuals and for diffusion through networks.

CP4—Fertility
(Katherine Faust)

Social Networks and Maternal Mortality in Rural Perú

Jeanine Anderson
Catholic University of Perú

Perú, along with Ecuador and Bolivia, has the highest rates of maternal mortality for South America; while other health indices are gradually improving, maternal mortality in the rural areas of the country seems to be on the increase. This paper reports on a study commissioned by the Peruvian Ministry of Health. A technique of "verbal autopsies" was used to reconstruct the context and circumstances of 30 cases of maternal death that occured during 1997 in poor rural areas of the Andes and the Amazon basin regions of the country. The women's social networks were reconstructed at three points in time and in three versions: (1) the "normal" social support network; (2) the "therapy group" that accompanied the pregnancy; and (3) the "action set" present during the crisis of the woman's death. In the crisis, large social networks were not necessarily an advantage as many of the cases show blocked decision processes where family members and health personnel disputed the course of therapy to be taken. Poverty and the lack of rural development contributed to the deaths in diverse ways as did the frequent undervaluation of women.

Social Networks and Sterilization

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Katherine Faust
University of South Carolina

This paper uses social survey data collected in Nang Rong, Thailand to address four interrelated questions regarding the impact of social networks on the decision to have a sterilizing operation. First, do social relations within villages have an effect on this decision? Second, to what extent does this impact depend on type of social relation, kin or economic? Third, are relations between individuals and households that extend beyond village boundaries especially significant for the choices couples make? Fourth and finally, to what extent do relations between villages also serve as a context for choice? In earlier work, we have found that social networks across multiple relations and at multiple levels of analysis affect choice of a temporary method of contraception (such as the pill, IUD, or injection). The current paper extends this work to choice of a permanent method.

Social Structure and Fertility Decisions: Evidence from S. Nyanza Province

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Jere R. Behrman and Susan C. Watkins
University of Pennsylvania

Demographers have increasingly argued that social interaction is an important mechanism for understanding fertility behavior. Yet, substantial uncertainty exists whether `social learning' or `social influence' constitutes the mechanism ``how" social networks affect individual's contraceptive decisions. This paper argues that these mechanisms can be distinguished by analyzing the social structure beyond the direct links between ego and her alters. The results indicate that the network structure modifies the influence of friends' family planning behavior on ego's contraceptive adoption. More importantly, the results suggest that social influence is a relevant aspect for understanding the diffusion of modern contraception. In the final section, this paper integrates these findings in a theoretical model of contraceptive choice and shows how social interaction can give rise to multiple equilibria and rapid transitions between demographic regimes.

Cognitive Dissonance and Uncertainty Regarding Fertility Preferences as Mediated by Personal Networks: Evidence from Nepal

Marc Boulay
Johns Hopkins University

There is growing evidence that the information women receive about family planning from the social network is influential in their decisions to use a contraceptive method. Little is known, however, how a woman's information-seeking strategy determines the composition of her social network and, by extension, the direction of the influence of her network. The present study offers preliminary evidence of the role of cognitive dissonance in mediating family planning information-seeking among women in Nepal. Cognitive dissonance theory predicts that an individual will be motivated to selectively seek information consistent with their attitudes and beliefs, particularly those related to one's self-concept. Women in rural Nepal remain largely defined, by themselves and by others, through their roles as wife and mother. Their status and security with the household will often depend on their success in these roles, particularly their success in bearing sons. Since information in favor of family planning may be inconsistent with these beliefs, women may be motivated to selectively seek negative information about family planning and, therefore, may be more likely to discuss family planning with women who oppose contraceptive use. Sociometric data were collected in November 1997 from all currently married women aged 15 to 49 years in six villages of Dang District in the Mid-Western Region of Nepal. It was hypothesized that women with low household autonomy would be more likely to discuss family planning with women who had negative attitudes towards family planning and less likely to discuss the subject with women who had positive attitudes towards family planning.

G4—Diffusion
(Ron Rice)

Structural Effects on Innovation Diffusion in Dynamic Organizational Populations: Insights from Computational Models

Deborah E. Gibbons
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Diffusion of innovations has been studied among individuals and organizations in various social systems, and several theoretical models have resulted. These models suggest that social contagion frequently fosters innovation diffusion. However, organizational fields often resist change for long periods of time, which suggests that interorganizational ties sometimes fail to transfer innovation. Along these lines, theorists have argued that the structure of an interorganizational network influences the pattern and extent of diffusion. Ideally, this claim would be tested by observation of multiple diffusions through different network structures within identical organizational fields. Although this could not be accomplished among actual organizations, it can be done through computer simulation. Therefore, this project uses computational models, with parameters based on empirical evidence, to simulate diffusion through various network structures within each of 100 unique organizational fields. This

blocked design allows comparison of outcomes across conditions, holding constant both initial population and initial adoption within each field. Effects of the various structural conditions on rate of diffusion, time to equilibrium, and final level of diffusion are analyzed to produce a set of testable propositions about effects of network structures on innovation diffusion among organizations.

The Diffusion of Scientific Ideas across Disciplinary Boundaries: A Citation Analytic Study of Chaos Theory in the Social Sciences

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It can be argued that informal networks — characterized by the interpersonal ties that exist within laboratories, "invisible colleges," and scientific associations — serve as the primary mechanism for the exchange of ideas among scientists within research areas, specialties, and disciplines. The interdisciplinary exchange of ideas has received less attention than the communication patterns that exist within disciplines and specialties, although it is the diffusion of innovations across disciplinary boundaries that might be expected to account for paradigm shifts of the sort that Kuhn argues mark the end of periods of "normal science." By looking at cases of cross-disciplinary diffusion and adoption of ideas, it may be possible to generate a more complete and coherent model of scientific change, growth, and progress. For example, what are the mechanisms through which ideas from the mathematical and physical specialty of chaos theory are adopted by social scientists? Besides informal communication networks characterized by "weak ties" between social and natural scientists, there would seem to be several other possible avenues by which social scientists' attention may be directed to chaos theory: (1) via articles published in general science periodicals like Nature and Science; (2) via popular science books like Gleick's Chaos: Birth of a New Science and other journalistic accounts of chaos theory; and (3) via "interdisciplinary migration" of scientists who, as their research interests shift, cross disciplinary boundaries and change disciplinary affiliations but bring the conceptual and methodological armature of their original discipline to their new research area. Each of these mechanisms might be expected to be characterized by different patterns of citation, "trusted assessorship," and other acknowledgements of intellectual debt within research articles and other publications by the social scientists who make use of chaos theoretic concepts. It may be further expected that different citation patterns would be associated with different ways of using chaos theoretic concepts — minimally, their use as metaphors for human experience or as the mathematical basis for modelling social phenomena. This study examines a sample of social science articles which make use of chaos theoretic concepts in order to determine what patterns of citation and acknowledgement exist within them, and to what extent those patterns are associated with particular ways of using chaos theory. In so doing, it attempts to understand the connection between the structure of scientific communication and the cognitive aspects of science.

The Greek GIS (Geographic Information Systems) Community: Heterogeneity and Constructed Advantage Within a New Technological Community

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The University of Sheffield

This paper aims to analyse the heterogeneous structure of a new technological community with reference to two social constructs, institutional setting and disciplinary background. These highlight the heterogeneous context within which GIS are embedded at a national scale. A graph of 51 teams and 95 linkages is put forward based on an ethnographic approach. The teams are small groups of individuals who adopted and implemented GIS innovations in government - university - private sector organisations throughout Greece, from 1985 to 1995. Teams were chosen as units of analysis because in the large majority of organisations, not the whole organisation, but only a small group of individuals is responsible for GIS adoption and implementation. The linkages have a multi-stranded nature (contractual, knowledge and social) mapping the functional interdependencies between these actors. The analysis with Ucinet and Krackplot based on 2-dimensional scaling of Euclidian distances shows the inner-circle of the Greek GIS community and relevant disciplinary groups such as surveying engineers who take centre stage in the development of this new technological community.

An Analysis of the Diffusion of Computer-based Innovations in a College of Education

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Texas Tech University
Thomas W. Valente
Johns Hopkins University

This study used social network analysis to study the diffusion of two computer-based administrative innovations within a university faculty network. Subjects were 66 faculty members in a College of Education from a southwestern university. At the beginning of the study subjects were introduced to the innovations and asked to provide demographic information and to identify communication partners in the areas of advice, friendship, and discussion. At the conclusion of the study subjects were asked to provide feedback related to the innovations and to once again identify their communication partners in the areas of advice, friendship, and discussion. The study revealed that the innovations did not diffuse through the college. A correlation analysis revealed that the communication networks were associated with one another and with organizational unit proximity, but not with spatial proximity. Only the friendship network identified at the end of the study was a predictor of time of adoption of one innovation. Sociograms suggest that interpersonal persuasion did not occur. The low density and centrality of the nomination networks are also an indication of why the innovations did not diffuse. The primary adopters of the innovations were not always the opinion leaders and a large number of disconnected participants were adopters.

P4—Regional Communication (Jeff Sharp)

Ready for Action: Organizational and Leadership Networks in Three Rural Midwestern Communities

Jeff Sharp
The Ohio State University

The structure of leadership and organizational networks in a community are hypothesized to influences a community's capacity to act. Two types of network data are analyzed to represent local community structure in three small towns in the Midwest. Interlocking directorate analysis of the boards of directors and officers of local organizations is used to identify central organizations and leaders as well as important cliques in each community. Data collected from interviews of reputational and institutional leaders also allows analysis of the consultation patterns of leaders with other local residents about community affairs. The network structures uncovered vary significantly across each of the three communities. The implications of these contrasting network structures are elaborated through a discussion of the relationship between network structure and examples of recent community development activities. The community with an amorphous organizational and leadership structure appears to have limited capacity to act while the community with a large, centralized organizational structure is the most successful at mobilizing resources and support for community action projects. The paper concludes with observations about how network analysis can be a useful diagnostic tool for assessing community capacity and guide development efforts aimed at improving local capacity to act.

Using Social Network Analysis to Map Economic Webs: A Case Study

June Holley
ACEnet
Valdis Krebs

Grassroots, bottom-up networking, between collaborating, complementing, and sometimes competing economic actors is seen as an effective way of creating value in today's fluid economy. Economic networks are receiving much attention outside the usual communities of interest. Michael Porter of Harvard Business School calls them 'clusters' and proclaims their key role in economic competition, while Chris Meyer of Ernst & Young, and Stuart Kauffman of the Sante Fe Institute call them 'economic webs', and see them as the crucial component of the complex adaptive economy. ACEnet [appalachian center for economic networks], a non-profit organization, has been building networked communities in Southeastern Ohio for many years. To examine their accomplishments and share them with funding organizations, ACEnet completed the first of many social network analyses[SNA]. Their goal was to visualize and quantify the emergent economic clusters in their region. The network maps and measures were used as discussion documents to plan future efforts, identify baseline accomplishments, and to provide feedback to network participants and sponsors. We will discuss our whole SNA process --what we did, what we learned, and what we will change in the future. Special attention will be paid to how SNA influenced ACEnet's network building strategies and methods.

Closure of Regional Actor Networks

Holger Spieckermann and Herbert Schubert
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The development of regions depends on the social capital of regional actors. Reliable relations between actors help to move in a personal network. Social capital is a connecting bridge supporting the exchange of resources between actors. According to Coleman there are two basic principles which have to be maintained in order to create sufficiently social capital: "closure" and stability of social networks and. Only in social networks with closure the actors may effectively combine their resources in collective sanctions. Examples for closure in social networks are cliques, social circles and multiplex relations. In the center of the analysis is the interaction between these patterns of relations and the influence of actors on regional decision processes. Based on empirical data collected from elite actors in the region of Hannover/Germany we show that closure of social structures facilitates the creation and maintenance of social capital in actor networks.

Actor Networks as Infrastructure of Modern Regional Management

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In contrast to hierarchical instruments such as plans or promotional programs cooperation models which are based on the understanding and self-control of the actors concerned gain more and more importance in regional development. This cooperation is supported and coordinated by "regional management". A prerequisite condition for self control is a network between the actors, which does not a priori follow certain aims. It is supposed: If "purpose-open" networks are successful, they are a productive collective property. Therefore they belong to the infrastructure of a region and strengthen its social capital. Regional management may use this productive collective property. But it may and has to form and support regional networks as well in order to improve the chances of development of a region by cooperation. With the example of the region of Hannover/Germany the following will be shown: information about regional networks that can be gained in practice, interpretationpossibilities with regard to regional development of the network structures found and startingpoints for action resulting from this.

TL1—Methods
(Tim Brazill)

Measurement Models for Social Distance

Timothy J. Brazill
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In this paper I continue my search for an objective and reliable method for sorting between competing measurement models for given social distance data. The models under consideration in this paper are two distance metrics, the two-dimensional Euclidean and the ultrametric. Discriminant analysis is employed to determine the relative efficacy of several evaluative criteria, including diagnostic measures and goodness of fit indices. The most effective means of discrimination is a combination of two criteria: the skewness of the distribution of distances and an ordinal measure of the fit of a two-dimensional Euclidean representation produced by an adaptation of correspondence analysis. The discriminant model involving these two criteria accurately classifies 94.9% of simulated matrices over several network sizes and error rates. I use a simple method of classification based on these discriminant analysis results to 'diagnose' several illustrative non-network data matrices, and several matrices of both observed and cognitive network data.

Two-mode Clustering for Multi-cultural Consensus and Block-modeling

John P. Boyd
University of California, Irvine

A fast two-mode clustering algorithm is applied to classic network data and compared with results from simulated annealing. The method is based on the non-parametric nearest neighbor, valley-seeking algorithm. It clusters the rows and columns simultaneously and does not require that the number of clusters be given a priori. Rather, the number of such classes is the result of the computations. A unified theory and a workable solution is found for two social network problems, multi-cultural consensus analysis and block-modeling.

Lattices and Dimensional Representations: Unifying Some New Approaches to Duality in Social Network Analysis

Ronald Breiger
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Philippa Pattison
University of Melbourne

There has been increasing interest in network research involving lattice structures, and in particular Galois or "concept" lattices. These representations display partial orderings among different types of entities (persons and groups; events and organizational projects; clientele and services provided; e.g., Freeman and White 1994; Mohr and Duquenne 1993; Mische and Pattison forthcoming; Breiger, forthcoming). The data to which such models are applied have almost always been binary arrays. There has also been increased interest in representations of valued arrays using singular value decompositions and loglinear and log-multiplicative models (Faust 1997; Goodman 1997; Greenacre 1994; van der Heijden et al., 1989; Han and Breiger, forthcoming). In this paper we demonstrate fundamental relations linking lattice and vector space representations of models for types of data structures ranging across Boolean, fuzzy, and real vector spaces.

A1—International Communication (George Barnett)

Who Calls Whom? Global Hierarchies and Telephone Networks

Hugh Louch, Eszter Hargittai, and Miguel Angel Centeno
Princeton University

Globalization is everywhere. States, economies, and societies are increasingly integrated. There is little doubt that we are undergoing a process of compression of international time and space; no country, economy, or society can expect to remain an island. But what does a globalized world look like? We use changes in international telecommunications to explore the process of globalization. Telephone contact includes both the social and economic dimensions involved in globalization, it serves as a wonderful reflection of the myriad of social, economic, and cultural links. We ask a set of simple questions: How much has telecommunications grown? How has that growth been distributed? How has the shape of the international network of countries changed over the past 15 years? In short, who calls whom? There are currently three dominant interpretations of the process of global interdependence - interdependent globalization, civilizations and empires, and hegemonic globalizations - and we have used them to structure our discussion of the data. These three generic perspectives serve as examples of three basic network patterns. With the help of network analysis we have been able to make the following observations: 1. While the amount of international communication did increase dramatically from 1983 to 1995, we do not observe a significant acceleration of this process. Moreover, we find remarkable stability in terms of who calls whom with the most popular countries remaining so. 2. There is little evidence of an increase in intra-cultural contact. 3. There is a clear hierarchy of telephone contact with most of it concentrated on and in the wealthiest countries. Less developed countries are either marginal to international communications or linked via asymmetrical relationships to a group of richer nations. 4. The "center" is increasingly monopolized by the United States with the relative position of Europe weakening. At least as measured by telecommunications, the global web may be expanding, but so is the importance and significance of the country at its heart, the United States. The point here is that in our conversations about globalization we should not forget its basic shape, i.e. increasing unipolarity.

The Process of Globalization: Examining Changes in the International Telecommunication Network 1978-1996

George A. Barnett, Tse-Mei Chen, and Pei-Szu Wang
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This paper examines changes in the structure of the international telecommunication network between 1978 and 1996 as a description of the process of globalization. Due to variability in the sample of nations, the analysis is limited to an examination of annual indicators of the overall network structure. The results indicate that while the network structure is quite stable, it has become denser, more centralized and more highly integrated over time. As suggested by World Systems Theory, particular attention is paid to the changes in centrality of three groups of semi-peripheral nations (Eastern Europe, Latin America and East Asia) during this period. The paper also examines in detail the changes among a set of 39 countries between 1991-1996 using QAP and the Galileo System. The results indicate that the positions among these countries are relatively stable and that the network is becoming denser at an accelerating rate. Finally, the findings identify precisely where (which countries) and when changes in the network take place.

Global National Telecommunications Centrality, Journalistic Repression, and Use of Internet for Democracy Discourse

James A. Danowski
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In recent years several researchers have described the world network of nations' telecommunications as constituting one large group with a center-periphery structure. This research now finds some movement toward regionalization of the network with emergence of an Arab-centered group along with a group comprised of the rest of the world nations. While this finding is interesting in its own right, the main purpose of

conducting network analysis of nation-to-nation telecommunications traffic is to enable testing of hypotheses about the position of nations in the world network and the extent of journalistic repression, along with possible compensatory communication via the Internet. Journalistic repression is indexed by Freedom House reports of the by the number of arrests, beatings, torture, murders, and other physical acts of violence against journalists. Network structure is based on *Telegeography* annual reports of millions of minutes of telecommunications traffic between pairs of nations. Democracy discourse is indexed by counts of the number of Web pages devoted to discussions of democracy. Based on theoretical principles of network structure, it is hypothesized that more peripheral nations have higher rates of journalistic repression. Moreover, controlling for Internet infrastructure development, the higher the repression, the more the emergence of alternative pro-democracy information content on the World Wide Web. The rationale for these hypotheses, the methods, results, and interpretations are discussed in the complete paper.

CP1—Family (Sara Horsfall)

Kin Networks and Nepotism: Examining Sociobiological Assumptions with Population Survey Data

Jan H. Marbach
Deutsches Jugendinstitut

The theory of "kin selection" was formulated by biologists in the 1960s (Hamilton 1964, 1975, Williams 1966, Trivers 1971). It presumes altruism among kin to be a trait of many species living in social units. Kin-related altruism is thought to have been evolved by natural selection as a mean to strengthen the altruist's "inclusive fitness", i.e. to transfer his or her genetical profile to the subsequent generation as successfully as possible. While kin selection has its main focus in altruism among parents and their offspring, nepotism extends altruism to lateral and more distant kin. Nepotism, then, marks a second strategy of the selfish gene (Dawkins 1976) to forward "inclusive fitness" beside childbearing and parenting. The paper will examine a corollary of the nepotism hypothesis which assumes a diminishing amount of nepotistic investment as the genetical distance becomes larger. Another topic will compare investments into consanguineous kin, affiliated kin, and nonkin. Eventually the question is tackled how investors' traits impact their engagement in nepotism. The discussion will take competing explanations based on rational choice theory into consideration. Data base is the 1994 Family Survey (N = 10,994) sampled by the German Youth Institute (DJI) in charge of the German federal government. It is representative for Germans aged 18 to 61 who were living in private households during the sampling spell. Kin relations are given by ego-centered network data using a set of 11 name generators and 6 name interpreters.

Trust in Marriage as Social Capital: Achieving the Optimal Division of Housework by Gender

Yoosik Youm and Edward O. Laumann
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Why do women perform twice as much housework as men do, even when both partners work? Two competing paradigms have attempted to explain this inequality but with mixed results: Becker's neoclassical economic model (Becker, 1991) and power-dependency theory (Lennon and Rosenfield, 1994). We propose a game-theoretic bargaining model (cf. Weesie and Raub, 1996) that holds that the relative level of trust between partners is a key contingency in specifying the expected division of household labor between men and women. Under the condition of high trust, the partners are assuredof the flow of future rewards and thus they can endure the present bads (i.e., household chores), yielding the unequal participation in householdchores by gender that the Becker model predicts. Under the condition of low trust, however, the partners no longer can rely on a flow of future fair rewards and thus act according to the power-dependency model. That is, women with more options outside marriage decrease their contributions to housework and perceive more unfairness in their relative contributions. We measure the relative level of 'trust' based on detailed information on the couples' social networks, using data from the Chicago Health and Social Life Survey (CHSLS). The CHSLS consists of across-section representative survey of 890 Chicago (Cook County) residents in addition to representative surveys of four Chicago neighborhoods. The CHSLS was collected between 1995 to 1997.

The Chaos of Families: A Network Approach to the Study of the Changing Roles of Men and Women

Sara Horsfall
Texas Wesleyan University

Gender relationships today are fraught with changes that challenge individual identities even as they create a new social mileau. Despite efforts to break free of traditional sets of expectations, stereotypical roles and expectations routinely appear in surprising places, even among those who believe themselves to be progressive and modern. The problem is that one gender cannot change alone. It is not only women who are recreating themselves in a new image. If women are to step out of the shadow of masculine accomplishments a new approach to life and living is demanded of men as well. This study examines the changes in men's and women's lives. A Parsonian concept of balance is used to highlight the fluctuations in interpersonal dynamics. Traditional roles are examined not as individual personalities but as negotiated interaction. Hegelian imagery of the Master/Slave interdependence is used to examine the emotional content of gender relationships. New scientific paradigms are invoked to understand the impact of gender changes on the institution of the family.

G1—Complexity (Barry Markovsky)

Process Data Meets Process Theory: Issues, Problems, and Prospects:

Norman P. Hummon and Patrick Doreian
University of Pittsburgh

An agent-based dynamic model of social balance is run using Newcomb's fraternity study network of affective ties as the initial conditions. The model's predicted trajectories of social networks are compared with actual networks from Newcomb's study. The comparison is not simple, because we have hundreds of possible theoretical outcomes, and only a single actual outcome. Moreover, we know that not all of Newcomb's fraternity members made social choices according to social balance criteria. Thus the issues of comparison are complex. This paper discusses these issues, and proposes some methods of dealing with them.

Empirical Evidence of Critical States in Organizational Populations

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In this paper we analyze the dynamics of organizational populations. If organizations compete for niche space (in multi-dimensional space), as argued by e.g., McPherson, then each organization can be seen as a node in a network with ties to other organizations. The qualities of these ties can be characterized as predator-prey, mutualist, competitive, or parasite relations. If the network were dense, we would expect it to display red-queen effects (chaotic co-adaptation); if it were sparse, we would expect it to be evolutionary stable (no co-adaptation). In between these two states there is a so-called critical state characterized by the lack of homogenous adaptive response to external disruptions on (or random fluctuations in) the system. We analyze organizational failures using time-series data on a total of 40,000 organizations, from 76 social movements in 10,000 municipalities of 371 jurisdictional districts of counties in Sweden between 1880-1939. To indicate adaptive response size, e.g., number of co-adaptive changes in the population, we study the number of organizational failures and the duration of succeeding organizational failures. On municipality level, we observe a power law distribution of both the size and duration of organizational failures, which supports the thesis that the organizational population is characterized by a critical state. However, this pattern is not observed when we analyze the same properties on county level: This indicates that the observed power-law is not produced by power-law distributed external factors. It also suggests that the organizational network we study is a geographically local phenomenon.

From Self-Production to Social Production: An Exploratory Study of Self-producing Systems and Job Satisfaction at the Western Transit Authority

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Within the last few years, research based on self-organized systems in the social sciences has burgeoned. From economics (Arthur, 1989) to groups, (Contractor and Seibold, 1993; Contractor, 1994), and organizations (Wheatley, 1992; Gregersen and Sailer, 1993; Svyantek and DeShon, 1993; Goldstein, 1994; Morgan, 1994; Taylor, 1995; and Thietart and Forgues, 1996) this research explores the parallels between social phenomenon and self-organizing systems. While many research programs attempt to define and explore the possibilities for self-organization in business settings, there has been a lack of research in the potential outcomes of self-organization. This study attempts to link the theoretical perspective of self-producing systems to organizational indicators such as job satisfaction and satisfaction with communication through a network analysis of 723 employees at a western transit authority.

P1—Political (Maryjane Osa)

A President's Network. Mexico's Carlos Salinas

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IIMASS-UNAM
Samuel Schmidt
Universidad Autonoma de Ciudad Jurez

In this paper we will revise the historical evolution of Mexico's president Carlos Salinas's network. While Mexico has been ruled by a cohesive network which has lasted over 70 years in power, the construction of a personal network is relevant to understanding how centrality can switch over the years and how cliques are created. At the same time, we will revise the notion of distance one as relevant when the network analyzed combines a functional connection and a practical accommodation of power.

Research Project: Applying Social Network Analysis: Political Networks and Social Relations

Sergio Guerrero, Jorge Miceli, and Agueda Quiroga
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The project describes the structure of a political network in a neighbourhood of a little argentinean city. Through the network flow material (as goods and services) and nonmaterial resources. The research focuses on the relationship between actors (individuals), measuring the kind, size and shape of ties among them. The project's first stage is the empirical identification of the network (actors, group and relations). The second one will attemp to modelize the structure, applying graph theory. The third stage will focuse on the process of change inside the group through time. The information will be gathered by face to face interviews and surveys, and the analysis of the information includes the use of informatical tools. The research will start on January 1999.

Changes in Individual Network Properties Over-Time and Political Outcomes

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Michael K. Orbach
Duke University Marine Lab

This paper follows a political network over a 6-year period examining individual variation in perceived political influence, centrality, knowledge of the network, and political consensus. The first section of the paper examines how these factors relate to variation in political consensus and knowledge of the political process. Here consensus is defined as the extent of retrospective agreement concerning political outcomes and knowledge is defined as the patterns of agreement on outcomes during the 6 year history of the political network. It is shown that although there is a general consensus on the nature of political outcomes (the data fit the Cultural Consensus Model) overall agreement is associated with knowledge of the political network (as measured through cognitive social networks). The second section of the paper describes a particular political battle and shows how eventual political outcomes could be understood through a comparison of network properties of the key players involved.

TL2—Visualization (David Krackhardt)

Centrality and Prestige Made Visible

Ulrik Brandes
University of Konstanz

Effective network visualization rests upon two pillars: clarity and substance. It is argued that current visualization techniques typically focus on either one of these aspects. A potential step forward is the integration of specific network information directly into a graphical design without neglecting clarity. We thus derive new visualization techniques that aim at exact representation of important structural variables in nevertheless readable pictures. The two variables considered here are centrality and prestige, and the images presented combine the benefits of precise tabulation with the convenience of graphical presentation. Interestingly, precursors of these techniques can be found in the not-so-recent literature (Northway 1940, Whyte 1943).

Visualizing Networks with Spring Embedders: Properties and Extensions for Two-mode and Valued Graphs

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This paper explores how the general ideas of a spring embedder can be extended to treat graphs where the nodes are linked by forces of different size (valued graphs) and graphs in which two distinct sets of nodes are connected (two mode data). Starting with a short account of the basic components of a spring embedder (attractive and repulsive forces), we summarize modifications and extensions of the basic concept reported in the literature. A closer look at the behavior of the single components will give us a basic understanding of the workings of these algorithms. The growing number of force and field conceptualizations that can be used as ordering principles point to future developments. This growing tool chest of ordering principles waits to be exploited for the quasi-experimental study of structures. In a third part of this paper we demonstrate and give results on the precision for implementations of spring embedders which are applied to valued graphs (where relations have different strength) and two mode information (relations between elements of two different sets).

Mapping a Three Dimensional Structure onto a Two Dimensional Plane

Linton Freeman
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Data on the airline distances linking the the capitols of the 26 largest trading nations were used. Those nations were projected onto a two dimensional plane using various standard algorithms from network analysis. Results are evaluated in two ways: (1) by correlating the 2D projected distances with the original 3D global distances, and (2) by using the judgments of accuracy made by a collection of college students. Comparing these results casts some light on issues of data reduction and on questions about what people "see" in simple presentations based on proximities.

A2—Intraorganizational (Alessandro Lomi)

An Over-Time Comparison Of Three Explanations Of Internal And External Innovation Communication In A New Organizational Form

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Hui-Jung Chang
National Sun Yat-Sen University

This research compares three differing explanations of the dynamic interrelationships between internal and external innovation-related communication in a new organizational form. In the functional specialization explanation, individuals are said to focus on the mix of internal and/or external communication dictated by their formal positions. The communication stars explanation suggests individuals maintain similar levels of communication in both networks. The cyclical model posits a more dynamic pattern with shifts back and forth between internal and external communication depending on the consequences of their prior communication behavior. The new organizational form examined over a three year period in this study was the Cancer Information Service, a geographically dispersed federal government health information program. The results indicated that there was a lagged effect for communication stars, suggesting the need for more dynamic tests of these processes.

Relational, Organizational and Institutional Bases of Sub-unit Performance in a Large University Hospital

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Università Cattolica del Sacro Cuore
Alessandro Lomi
University of Bologna

Using data collected in a large University Hospital in Italy, we explore the relational, organizational and institutional bases of sub-units performance. Our study aims to evaluate the differential performance implications for hospitals of alternative approaches to the design of internal healthcare

activities based – respectively - on equivalence criteria, managerial prescriptions and institutional norms. We collected data on functional interdependencies and exchange of consulting services among the hospital's 34 ward-units, which collectively accounted for 34.820 discharges in 1997. We computed a comparative performance index (CPI) for each of the 34 ward-units and transformed the vector of individual performance scores into a square (34x34) matrix of absolute performance differences among organizational units. Using permutation methods we correlated the matrix of performance differences with three different structure matrices set up to capture the implications of alternative approaches to organizational design. The first approach is based on the results obtained from an exploratory blockmodel analysis of the matrix of functional interdependence. The second approach is defined in terms of the design indications provided by the hospital's top management team. The third is based on a prescriptive model suggested by the National Agency for Health Care Service (Ministry of Health, Rome) for the transformation of hospitals' organizational structure. Our results suggest that a partition of the hospital units based on equivalence criteria seems to account for intra-organizational performance differences more accurately than partitions based either on prescriptions or institutional norms.

Account Management's Internal Relationship Marketing: Implications of Internal Social Network Structure for Account Management's Effectiveness

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Account management is a special form of sales that should increase market orientation by relationship marketing. Shapiro and Moriarty (1984) found that for account managers' their relationship with internal support systems are of vital importance. These support systems determine to a great extend if 'things are getting done' for customers. However, there have been found no rigorous studies into the mechanisms that account managers use to coordinate internal support systems. In this paper we propose that internal relationship marketing is a coordination mechanism that facilitates in 'making things happen' for customers. Internal relationship marketing considers relational transfers between parties within organizations, instead of discrete transactions. Two functions of internal marketing, (the information and the motivation function, (Arndt 1983)) are considered to able account managers in 'making things happen'.A social network approach allows for gaining insight in how things are getting done within organizations. We specifically use Burt's (1992)structural hole theory to link internal relationship marketing with the social network perspective. We recognize the relation between the information and motivation function of internal marketing and the information benefit and control benefit in high structural autonomous positions. Using structural autonomy as proxy for opportunity to engage in internal transfers in a theoretical analysis, we conclude that internal relationship marketing is important for individual account managers' effectiveness.

CP2—STDs (Tom Valente)

Sexual Contact Networks and Chlamydia Transmission in Manitoba

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J. Wylie
University of Manitoba and Cadham Provincial Laboratory

The Communicable Disease Control Unit of Manitoba Health maintains a centralized provincial database of sexually transmitted disease index cases and their contacts. A subset of this database, from November, 1997 to May, 1998 was used to examine the size of the sexual networks present in Manitoba during this time period and the extent to which these networks spanned large geographic distances within the province. The software program Pajek was used to construct the networks. A total of 1503 networks were identified ranging in size from dyads (911 networks) to the largest network containing 82 people. Data from 21 of the largest networks (>11 people) are presented here. The majority of networks were not restricted to one geographic area. Some networks contained contacts in adjoining provinces (Ontario, Saskatchewan, and British Columbia) and one state (North Dakota). Frequent contact between network members from a small group of northern reserves and individuals in the major southern population centre of Winnipeg, form bridges of transmission between these communities. Together, these network members may constitute one of the STD core groups in Manitoba.

Network Data in Hiv Epidemiological Research: Sexual Networks in Rural Uganda

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Maria J. Wawer
Columbia University

The study of social/sexual networks is an innovative approach to HIV research. A randomized community-based trial of STD Control for AIDS Prevention in Rakai, Uganda collected sexual network data on the last four sexual partners of 11,618 subjects (HIV prevalence 16%). The Rakai study is an epidemiological survey which used serology testing to determine HIV/STD incidence and prevalence. We compare the incidence and prevalence rates of individuals and communities by sexual partner concurrency (the proportion of contemporaneous sexual relationships) with number of sexual partners irrespective of concurrent overlap. We consider concurrency status and mean duration of concurrency at the individual level, and network concurrency at the population level. The majority of subjects with multiple partners in the past year (N=2329) had concurrent relationships (84%). In this population we found concurrency to have a less than significant effect on the determination of HIV risk when adjusted for number of sexual partners at both the individual or community level. We also explored sexual partner characteristics, derived from egocentric survey questions, to determine why adolescent females had higher rates of HIV infection than adolescent males in the Rakai population.

Gonorrhea Types and Sexual Networks in Manitoba, Canada

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In order to define the existing types of gonorrhea in Manitoba and describe the associated sexual networks, all isolates submitted to Cadham Provincial Laboratory gonorrhea culture from October, 1996 until September, 1997 were collected. The isolates were typed by pulsed field gel electrophoresis, serotype and opatype. Information on the partners of these individuals from the provincial communicable disease control unit was entered into social network analysis programs. Using the partner information of 29 individuals with isolates, 23 networks consisting of 81 individuals were constructed. The networks ranged in size from one to 14 individuals. There was agreement of pulsed field type and serotype within each network with multiple isolates. However, the opatypes were more variable. Of all 81 individuals, 15 (19%) individuals were reported as having residences which differed from the predominant community of the component. This suggests that the use of geography as a marker for organism type is less sensitive than sexual networks. The combination of sexual network analysis with molecular biology is a valuable approach for understanding the genetic distribution, transmission, and antimicrobial resistance of Neisseria gonorrhoeae.

G2—Social Capital (Scott Feld)

The Effect Of Social Capital In Alleviating Poverty. Results From A Household Survey In Santiago, Chile

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Universidad De Santiago De Chile

The literature on poverty in Latin-America consider social capital one of the assets that should help people to overcome poverty and prevent their re-entrance (Moser 1996). Using data from a 1996 household survey in Santiago (N=625) I will discuss the specific effect of social capital on three types of family: those that were always under the poverty line, those that have managed to move above the poverty line and those that had always been above the poverty line. Some of the main results follow: The personal networks of families that had never been in poverty are larger in size and show greater variety compared to the other groups. The effectiveness of norms to bring about order in the neighbourhood is larger among those that had never been in poverty. However there is no trace of *culture of poverty*. The definition of a collective social identity and position shows strong differences between men who stress structural traits and women who stress personal attributes. In the short run, the schooling of family members, the family organization and individual motivation keep their explanatory power of the families social mobility. In sum, the influence of individual dimensiones in alleviating poverty cannot be disregarded to favor exclusively social capital. In what concerns social capital, its structural components have higher explanatory power than collective identity or normative effectiveness.

Organizational Participation and Personal Network Structure: Shaping Social Capital Early in Life

Pamela A. Popielarz
University of Illinois at Chicago

We know that personal networks affect individual outcomes that are of interest to sociologists, including labor market participation and success, entrepreneurship, criminal behavior, mental and physical health, and so on. But we know less about the forces shaping personal networks. For instance, how does participation in organizations, especially multiple organizations at once, affect personal networks? If network ties grow out of repeated contact between people, and such contacts tend to occur in the context of organizational participation, then network parameters such as size, density, and homophily will respond to organizational size, heterogeneity, and turnover. I investigate several of these questions in the context of a population at risk of experiencing upheaval in personal networks: college freshmen at a large, diverse urban university. I use multi-level models to ascertain the effects of participation in work, student organizations, and classroom courses on personal networks. Controlling for the relevant individual traits and experiences, the size and heterogeneity of these opportunity structures do appear to have a constraining effect on participants' network size and homophily. The results imply that organizational participation at this critical point in the life course influences social capital accumulation, and through it, affects various types of success later in life.

The Homophily Trap: Structural Changes in the Personal Network over the Life Course

Shin-Kap Han
Cornell University

How does a person's social network change over the life course? What are the consequences of those changes in terms of social integration? These are the issues the proposed research will focus on. I will examine three structural parameters of the personal network – size, composition, and homophily bias – over the life course with respect to participation in voluntary associations. The existing evidence, when pieced together, suggests that those who are older are likely to have a network that is smaller and less varied, and that voluntary associations with older membership are more likely to be small, static, inwardly-oriented and marginal. This is what I call 'the homophily trap,' with significant negative effects on social integration. My plan for the research is first to specify the three-parameter model of the personal network over the life course and to relate that to the dynamics among voluntary associations. Second, the model will be empirically tested with available public-domain data. Finally, the implications of the evidence as well as the model will be considered.

P2—Political (Jorge Gil-Mendieta)

Network Expansion and Protest Cycles: The Organizational Infrastructure of Opposition in Poland, 1954-59

Maryjane Osa and Claire Youngblood
University of South Carolina

Archival data collected from the Hoover Institution archives were used to compile a data base of individuals and groups active in the social opposition in Poland from 1954 to 1959. These data are used to define three affiliation sets operating during 1954/55, 1956/57, and 1958/59. The three intervals cover a wave of collective action that coincided with de-Stalinization in Poland. According to Sidney Tarrow, such collective action cycles respond to the opening, diffusion, and closure of political opportunities. Our network data map the avenues for resource mobilization among the social opposition groups. Analysis of structural vulnerabilities of the network explains why rapid counter-mobilization by the state was successful in damping down social protest. Examination of structural changes between affiliation sets (from T-1 to T-3) shows how a triad Catholic groups among the social opposition gradually becomes the stabilizing base of an emerging organizational field.

An Exploratory Study Assessing the Validity of Archival Data Used as a Proxy for Respondent Enumerated Networks

Tracy Burkett
College of Charleston
Jennifer Stewart
University of South Carolina

This study is an attempt to assess the feasibility of using archival data as a proxy for respondent enumerated networks. Ego generated network data are rich in detail, context, and are, perhaps, the best reflection of informal network structure. However, small sample size, limited access to respondents, and inaccurate respondent recall are just a few of the problems endemic to this approach. Archival data, on the other hand, while avoiding the problems of sample size, access and recall, may obscure the complexity of "real world" relations and there is a sense that essential network ties may be masked . In this study, we construct two types of networks on the same actors. First, we construct a network using respondent questionnaires to examine the form and character of formal and informal communication ties among legislators in the South Carolina General Assembly. We next compare these networks to networks generated from archival data that record legislative cosponsorship events. The implications of the comparison for the construction and management of network data are discussed.

Organizational Genesis, Identity and Control: the Transformation of Banking in Renaissance Florence

John F. Padgett
University of Chicago & Santa Fe Institute

In this paper, I use my empirical research on Florentine banking as foundation from which construct a more general theory/ interpretation of the genesis of organizational morphology. At the level of organizational development, this involves logics-of-identity, rooted in both political and career access, unfolding through social networks. At the level of organizational speciation, this involves the realignment of logics-of-identity through the often tumultuous rekeying of access linkages between politics and markets.

TL3—Groups (Christine Avenarius)

Pattern of Communication Networks in German Rural Society

Kai Stahr
Universität Giessen

The valuation of information and the forming of opinions and attitudes take place in communication exchange. Pattern of such valuating structures can be described by the concept of social networks. It might be interesting to see how parameters of the natural and cultural environment do influence the structure and development of those networks. The analysis of 8 villages in rural regions in Germany is supposed to investigate the effect of specific parameter on network pattern. It was entirely taken by a saturation sample of 946 person, including 74 farmers. Based on the data, received by face to face interviews, we did an ego-centered network analysis. The analyzed networks proved to be not thematically specific and had high net density. These eight networks can be classified into three types of pattern and are subdivided by hard and soft factors. As a result, the development of networks essentially depends on the existence of social clubs, parish groups and cultural or educational institutions. Infra-structural parameter only have minor influence on these networks. It is possible to determine basic interconnections between social and cultural parameter on one and the net structure on the other hand.

Using Pile Sort Data to Describe Youth Gang Structure

Gery Ryan
U Missouri, Columbia
Mark Fleisher
Illinois State University

The vast literature on American youth gangs almost never looks at the internal structure youth using formal data collection techniques. This paper uses pile sorts obtained from three hardcore female members of a larege Kansas City, Missouri, youth gang called the Fremont Hustlers. Most generally, these data show that gang researchers' and youth gang members' perceptions of a youth gang's internal social and political structure do not correspond. Ethnographic data are necessary to establish contextual meaning.

Cohesion and Connectivity: Network Position and Attachment to Group

Pamela Paxton
The Ohio State University
James Moody
University of North Carolina at Chapel Hill

In this paper, we explore the relationship between an individual's subjective assessment of group attachment and their objective position within the global social network. Using data from a small southern sorority - which shields our setting from the confounding influences of attribute heterogeneity - we combine latent variable models of subjective group attachment with network measures of sub-group membership and centrality. At the individual level, we find that those members who are most central to the network feel the largest sense of attachment. We also find that sub-groups within the overall network differ in their level of attachment. Sub-groups that simultaneously maintain a minimum number of relations with the sorority as a whole while maintaining strong sub-group ties have members with the highest level of overall group attachment.

A3—Methods & Statistics (John Boyd)

Eigenvalue Bounds

A. J. Seary and W. D. Richards
Simon Fraser University

We view the (signed) eigenvalues produced by Correspondence Analysis as belonging to the spectrum associated with the combinatorial Laplacian operator. We show how this spectrum can be used to provide bounds on certain graph theoretic properties such as distance, diameter and expansion. When a graph is far from being random, the eigenvalues provide bounds on local properties such as the distances between subsets of nodes and thus produce bounds on the number of cohesive blocks (where the eigenvectors provide blocking information). For random and semi-random (Watts & Strogatz, 1998) graphs, the extreme eigenvalues can be used to bound global properties such as diameter and expansion.

Testing Goodness-of-fit Between Network Data and Random Block Models

Ove Frank
Stockholm University

Random block models are considered for multivariate network data. Such data comprise individual attributes of categorical or numerical type as well as one or more relationships defined for pairs of individuals. The relationships could have values of strengths or other characteristics attached to them. According to the model, dyads are independent conditionally on the individual attributes, but unconditionally they are generally dependent. In order to estimate and test the appropriateness of the random block model it is necessary to find relevant statistics. Maximum likelihood estimators are well known but goodness-of-fit statistics are less straightforward and have not been much developed for graph models. A general method is suggested for measuring and testing goodness-of-fit for random block models with an arbitrary number of manifest blocks. The test statistic has an asymptotic chi-square distribution under the model assumptions. The power of the test against different alternatives has still to be investigated and is probably not finished before the Sunbelt meeting.

A Posteriori Stochastic Block Modeling for Graphs with Valued Edges

Tom Snijders
Technology University of Groningen, The Netherlands
Krzysztof Nowicki
University of Lund, Sweden

A statistical approach is proposed to a posteriori blockmodeling for graphs and digraphs with valued edges. The observational data considered consists of one such graph or digraph. The model is defined by a partition of the vertices of the graph into several unobserved (latent) subsets and the assumption that the probability of a relationship between two vertices depends only on the subsets to which they belong. This model leads to a stochastic block structure for the adjacency matrix. The purpose of data analysis is estimation of the probability parameters as well as recovery of the latent subsets. A Bayesian estimator of parameters, Gibbs sampling, is proposed. This estimator is practical also for relatively large graphs. The block structure can be predicted from posterior predictive probabilities.

CP3—Intraorganizational (Arent Greve)

Comparing the Influence of Human and Social Capital on Performance

Arent Greve
The Norwegian School of Economics and Business Administration
Mario Benassi
University of Trento
Julia Harkola

The paper investigates the relation between human and social capital and productivity in an organization. Productivity is usually seen as an outcome of organizing human resources and technology, where differences in individual productivity are seen as a difference in human capital, or competence. This study compares the effect of competence and social capital on productivity, where social capital is defined as a property of personal networks, the ability of individuals to use their personal contacts for getting advice, solving problems, etc. Previous studies have shown effects of social capital on a variety of outcomes such as entrepreneurship, occupational attainment, and pay levels. Under the assumption of specialized work, this study analyzes how social capital is necessary to combine a set of experts to complete complex tasks. The social capital is used to mobilize a set of experts to work in project groups. Data is collected from a firm's archives and a questionnaire to the participants. The study finds an effect on productivity from both competence and social capital, however, the effect of the latter is stronger than the effect of competence.

Small Business in Portugal: The Importance of Social Networks to the Survival, Maintenance and Growth of Industrial Ventures

Mafalda Cardim
London School of Economics and Political Science

The paper describes the way Portuguese entrepreneurs from 1993 to 1998 drew on their social networks to improve the success rate of their ventures. I question whether the entrepreneur's social performance influences the survival of the venture. I concentrate on an analysis of small businesses, arguing their performance is substantially dependent on the owner's performance. It is commonly stated that businesses suffer greater mortality rates during the first years of life, due to the initial period of business settlement posing many trials to the entrepreneur and to the venture. I evaluate the extent to which entrepreneurs rely upon their social relations to provide them with assets needed for the functioning of the venture and to what extent this enhances business success or failure. The businessman/woman can not only take an active role in the management of the business but also in the management of his/her social life, customising it to the benefice of the venture.

G3—Health (Jane Holschuh)

Racial and Ethnic Differences in the Social Networks and Service Networks of Persons with Serious Mental Disorders

Jane Holschuh
University of Wisconsin-Madison

The NIMH "Community Support System" posits that an array of both formal services and informal supports is necessary to maintain clients with serious mental disorders in the community and to enhance their quality of life. This paper seeks to understand the differences in informal social networks/support and the need for and utilization of formal mental health services between white (majority group) and non-white (minority group) clients. A growing literature on racial and ethnic variation in social networks/support in the general population documents that persons from non-white cultures often have larger, kin-based networks that consist of extended family and "fictive kin" or non-kin who take the roles of family members and provide substantial informal support. Similarly, differences exist in how and whether non-whites seek help from formal mental health services with such persons tending to use lay networks of care. Few studies have examined whether these unique patterns also hold for persons with major mental disorders. Two studies that found no differences in networks/support between whites and non-whites with mental disorders used samples of only minority subjects, drawing their conclusions on comparisons with other samples in the literature. Using interview data from a mixed sample of 112 clients of 4 Community Support Programs, this paper compares the networks of white and non-white clients. It describes which formal services are needed and used by this population. It also examines whether race and other factors such as age, diagnosis, and symptomatology predict the structure and content of clients' informal networks and the formal services they need and use. Results show that non-whites named more kin and fewer non-kin in their networks than whites. Non-whites named more kin and fewer non-kin outside the household. Also, race and ethnicity appear to be important factors in predicting the network of services that clients need and use.

Clinical and Situational Predictors of Social Networks Among Persons with Schizophrenia

Beth Angell and Mary Ann Test
University of Wisconsin

Past studies show that the personal networks of persons with schizophrenia and other major mental illnesses are smaller and less reciprocal than those of the general population; and perhaps consequently, these individuals complain frequently of loneliness and dissatisfaction with their social relationships. Few studies, however, have systematically examined the factors related to social network characteristics, particularly using longitudinal data. This presentation contains an analysis of clinical and environmental predictors of change in an array of social network characteristics over a six month period among a sample of 87 subjects participating in a longitudinal evaluation of PACT, a model community treatment program for persons with severe mental illness. Results show that the change in psychotic symptomatology is the most potent predictor of social network change over time; that living alone is weakly associated with reductions in network size and opposite sex contact; and that, contrary to our hypotheses, residential mobility and work involvement are unassociated with changes in social networks over time.

Sensation Seeking, Peer Networks, and Drug Use among Junior and Senior High School Students

Lewis Donohew and David Helm
University of Kentucky
Ronald E. Rice
Rutgers - The State University of New Jersey

This study argues that both biological and social factors are strong influences on use of drugs by adolescents and teenagers, and, further, that these factors may interact. Thus, both biological and social factors offer avenues for targeting prime at-risk groups and designing messages and programs to reach them. The biological factor explored here is sensation-seeking, and the social factor explored is the attitudes, behaviors, and sensation-seeking of respondents' three named best friends. These factors are included in a longitudinal structural model that is tested over three cohorts of an average of 1900 junior- and high-school students, each measured at three successive grades. Both one's own sensation-seeking, and peer influence (drug use, sensation-seeking), along with prior drug use, are the main predictors of specific drug use at the end of the periods.

P3—Experimental (Shane Thye)

Accuracy of Prediction in PD Game and Trust in Group

Ryuhei Tsuji
University of California, Irvine

Kikuchi, Watanabe, and Yamagishi (1997) found that those who tend to trust others in general are good at predicting others' behavior in anonymous one-shot prisoner's dilemma (PD) game. However, their experiments were conducted using subjects who do not know each other before the experiment. Our experiments innovate, in comparison, in that, subjects (4 groups of students) knew each other beforehand. We hypothesized that subjects used their evaluation on trustworthiness of particular others (based on their past experiences with them) to predict their PD decision. Our results show that subjects who distinguish several levels of trustworthiness among others, predict decisions of others in the group less well, when one controls for group structural properties such as symmetry and transitivity. On the other hand, subjects who are cautious about trusting others in general (measured by a psychological index) make better predictions. Implications for general trust theory will be discussed.

The Location of Decisional Power in Influence Networks

Mark S. Mizruchi and Blyden B. Potts
University of Michigan

In earlier decades, network analysts focused on centrality as a source of power in social networks. In recent years, as network analysts have emphasized exchange networks, they have moved away from a focus on centrality and have instead studied the ability of certain actors to restrict the opportunities of other actors, a factor that is potentially independent of centrality. Because of the recent attention given to exchange networks, however, network analysts have paid considerably less attention to communication/influence networks, in which success rates among actors are not zero-sum. Most analysts who have explicitly acknowledged the distinction suggest that centrality should still have a significant impact on power in these non-zero-sum networks. In a recent study, using variations of a restricted access network widely-used in exchange network research, we found that even in influence networks, whether central actors were the most powerful was contingent on two factors: the existence of an even number of network subgroups and whether the most peripheral actors were allowed to directly influence one another. This suggested that some of the findings from studies of exchange networks might also hold for influence networks. In this paper we further examine the relation between position and power in influence networks, focusing on the ability of actors to "get their way" in voting situations. Applying our analysis to the nine networks used in the 1992 special issue of *Social Networks* on power in exchange networks, we use our findings to compare in more detail the relation between position and power in both influence and exchange networks.

Coalitions in Exchange Networks: Experimental Results

Phillip Bonacich
University of California, Los Angeles

Sets of positions in exchange networks can affect one another's rewards even if they do exchange with one another. The competition between sets of positions to exchange with a high powered position reduces all of their rewards. In the standard exchange experiment coalitions are ruled out because positions that do not exchange with one another cannot communicate. This paper reports experimental results testing a theory of which positions in exchange networks will form coalitions and which coalitions will be effective. In the experiment positions sets of positions are allowed to form binding agreements concerning their behavior toward others not in the coalition. The theory suggests that coalitions should occur in bipartite networks with strong power differences where each of the two sets of positions have at least two members. Experimental results support the theory, but suggest some modifications.

TL4—Intraorganizational (Nosh Contractor)

Building Communication Networks: Integration Through International Manager Transfers In Multinational Corporations

Martine R. Haas
Harvard University

This paper examines the building of international networks by managers in multinational corporations. Researchers have proposed that the practice of international manager transfer is one way to increase global integration through the establishment of communication ties between a multinational's international offices (Edstrom & Galbraith, 1977; Nohria & Ghoshal, 1997). However, the empirical evidence has been mixed. This analysis of 219 managers based in 17 international offices of two multinationals therefore explores the conditions under which transferred managers might be expected to build more extensive global communication networks. The results show that global exposure does not necessarily result in the establishment of global communication ties, even when the transferred managers are involved in global work. However, when the multinational invests in building the transferred managers' global identity, more global ties are established. These findings suggest that multinationals cannot simply assume that global tie formation will follow from international manager transfers; rather, suitable organizational conditions must support the practice if it is to yield network building benefits.

The Agency behind the Chart: A p-Model for Communication, Advice and Trust Relations*

Uwe Serdült
University of Zurich

The paper is about an application of the more recent p*-odels introduced and further developed by social network researchers as Stanley Wassermann. The technique is used in order to find explanations for the probability of communication, trust and advice relations within a governmental agency. The governmental agency is responsible for administering the real estate of the Canton of Bern, Switzerland. The agency is composed of two divisions (real estate and finance). All 15 employees have been asked by questionnaire (face-to-face interviews) about their relations among each other as well as with other agencies, QUAGOs and/or private organisations. Additional attribute data (location of office, level of hierarchy, sex, education, age, years of service and the most simple version of Inglehart's Postmaterialism Index) are included in order to provide better explanation of relational configurations within the agency.

Informational Power and Network Analysis

Johanne Saint-Charles
Université du Québec à Montréal

Acknowledged as one of the most important base of power for actors in organizations, informational power - based on perceived access to sources of relevant and privileged information - remains resistant to reveal its secrets. Network Analysis may be a method providing new research avenues in the exploration of informational power. In this paper we will show how Network Analysis throws a new light on informational power, both on the theoretical and methodological level.

A Social Network Approach to Strategic Human Resource Management

Stephen Teo
University of Technology, Sydney

A main feature of strategic human resource management (HRM) is the centrality of the function in the strategic management process. As the responsibility for people management has been decentralised from HRM practitioners to line managers, it has been argued that practitioners will be able to focus on providing strategic advice to line managers. However, little research has been carried out to examine this aspect of strategic HRM from a Social Network perspective. This study adopts a Social Network perspective by examining the network relations of the Corporate HRM Unit of a large Australian public sector organisation. Strategic HRM effectiveness can be evaluated by examining the centrality of interactions between Corporate HRM practitioners and their major stockholders, including line HRM practitioners, line managers, and trade officials. I use four structured advice network questions (inward and outward relations) in two network studies: (i) study one focuses on the strategic advice role of the corporate HRM unit, and (ii) study two focuses on network relations of members of an ego network in the host organisation's HRM Strategies Committee. Results suggest that the Social Network approach can be used to examine the centrality of the HRM function in the strategic management process.

A4—Methods (Martin Everett)

Keeping Count of Fish using Log-linear Methods

Elisa Bienenstock
Stanford University

Distinctions between different types of exchanges are confusing and often contradictory. Restricted exchange is expected to be dyadic, reciprocal and as defined by Ekeh (1974) economic in character. With restricted exchanges quid pro quos are expected. Generalized exchange, on the other hand, extends beyond the dyad, permeates a group and accounting is difficult. These distinctions are theoretical. While some laboratory work has been done to investigate the dynamics and results of the different types of exchanges, little field data has been collected. There are two reasons for this, one is that it is difficult to observe exchange in the field. The other is that even if the data were collected it is unclear how it would be analyzed. Breiger and Ennis (1997) show how Log-linear models can be used to capture the idea of generalized exchange. This talk builds on their idea, using data on exchanges, to show the power of the log-linear model to contribute to the discussion of exchange. This paper uses data on the exchange of fish over one season between migrant fisherman in Alaska. Status and clique structure can be discovered using a model of quasi-symmetry. In addition log-linear analysis can be used to determine if the exchanges are restricted or generalized.

A Comparison of Spectral Methods for Graphs

W. D. Richards and A. J. Seary
Simon Fraser University

We compare and contrast three methods of spectral analysis of graphs: the Adjacency, the Laplacian, and the Normal (combinatorial Laplacian). We present an analysis of the strengths and weaknesses of these methods and a discussion of the relative advantages and disadvantages of each to the network analyst: What do these methods tell you about your network? How well does each method's low rank representation describe, both numerically and graphically, the major structural features of the network? We use a variety of network configurations to illustrate our answers to these questions.

Network Models of Food Webs Part I

Jeffrey C. Johnson
East Carolina University
Stephen P. Borgatti
Boston College
Joseph Luczkovich
East Carolina University

This is the first of two papers examining both the theoretical and practical application of graph theoretic and algebraic network concepts to the study of food webs. Food webs and their properties make them particularly well suited for a variety of network approaches. Three food web examples are presented in which the ecological ideas of compartments (also called tropho-species) and trophic levels are modeled through the use of both structural and regular equivalence. The first example demonstrates the appropriateness of the both types of equivalence in the modeling of a simple Antarctic food web involving 2 trophic levels (species of polychaets and algae). This is followed by the application of these methods to two more complex systems including food webs within a tropical rain forest and a seagrass ecosystem. The paper concludes with a discussion of the adequacy of these methods for representing critical ecological concepts and a brief discussion of issues surrounding data quality and the visual representation of food webs.

Network Models of Food Webs Part II

Stephen P. Borgatti
Boston College
Jeffrey Johnson and Joseph Luczkovich
East Carolina University

Building on the companion paper, Network Models of Food Webs Part I, in this paper we consider ways in which fundamental ecological concepts and processes can be understood and illuminated in network terms. In particular, we consider graph-theoretic ways of examining emergent properties of food webs (ecological niches, interspecific competition and food web complexity). Using graph theory, we can now identify natural groups of species with similar diets (using structural colorations) or similar ecological roles or niches (using regular colorations). We can also rank species by trophic level and examine impacts of competition and predation. Finally, the formal representation provides us with new ways to think about the relationship between species morphology and species position in the foodweb.

CP4—Service Delivery (Michael Calloway)

Using Network Analysis Methods to Evaluate Public Health LeadershipInstitutes: An Example from the Mid-Atlantic Health Leadership Institute

Rebecca Malouin, Marie Flake and Thomas W. Valente
The Johns Hopkins University

The Mid-Atlantic Health Leadership Institute (MHLI), modeled after the Centers for Disease Control and Prevention (CDC) National Public Health Leadership Institute (PHLI), is one of several state and local leadership programs aimed at developing leadership skills for public health practitioners. One of the primary objectives of the Mid-Atlantic Health Leadership Institute includes "building a network of individuals and organizations with shared vision and capacity for improving the health of communities." Network analysis of the first cohort of scholars indicates that the participants significantly increase their knowledge of organizations and individuals within the organizations at the completion of the program. The participants also reported a significant increase in collaboration and advice-seeking from such individuals within the organizations. Combined with other evaluation measures such as program evaluation surveys, network analysis provides a complementary measure of participants' satisfaction with and achievement in content areas including personal development, communication, politics, organizational dynamics, and collaborative relationships. Consequently, network analysis is strongly recommended as a complementary method of evaluation for public health practice programs focused on collaboration between organizations and their corresponding representatives.

The Spanish Health Political Field: Actors, Political Actions and Outcomes.

Josep A. Rodríguez
Universitat de Barcelona

In this paper I build and analyze the health care political field in terms of political ideology, political actions and political outcomes of the main political actors and health and medical interest organizations. In order to understand the entire political dynamics, maps of political and action similarities are built. I also study the social structure of the political field and the positions of the actors (interest organizations, political actors) based on their systems of relations and interactions. And finally, I analyze the impact of actors' structural positions and systems of relations on the outcomes of their political actions. Data comes from the survey on the entire universe of health care political actors in Spain at the beginning of the 90s addressing specific political, action, and relational questions (Josep A. Rodríguez, The Politics of Medicine in Spain).

Trends in Linkage Behavior Among Care Providers for Homeless Persons Who Are Seriously and Persistently Mentally Ill

Michael Calloway, Sharon Topping, Terri Nadlicki, and Joseph P. Morrissey
The University of North Carolina

We focus on the delivery of care to homeless persons who are seriously and persistently mentally ill (SPMI). Service fragmentation is a serious barrier to service availability and accessibility, particularly for this population. As a result, the development and maintenance of linkages between human services organizations are critical for outreaching, serving, and following SPMI between community-based providers. This paper examines (1) the extent of possible service linkages that actually exist and how they change over time and (2) the type of changes that occurred. The data are from the national evaluation of the SAMHSA sponsored demonstration project, ACCESS, that focuses on outreach and case management to homeless SPMI clients. The data are longitudinal (Wave 1-1994; Wave 2-1996) measuring the interorganizational relationships among service programs providing care to this population in 18 sites across the country. The focus is on client referral linkages--the sending and receiving of homeless SPMI for each site and time period--between and among human services organizations. A tie is defined as a confirmed referral relationship. Each possible linkage will be categorized using four mutually exclusive service relationships: (1) Mutual Reciprocal Tie, (2) MH Initiated Tie, (3) Attempted Tie, and, (4) No Tie.

The Evolving Network of Literacy Agencies in Haiti: Structural Content and Implications

Hank Green
University of Florida

The end of the Cedras regime has led to the gradual reinstitution of literacy programs across Haiti. These programs, using a variety of pedagogical approaches and materials, have been operating primarily independently, or with only the assistance of the Secretary of State for literacy. In the past year, several of these agencies have begun working together to establish an interorganizational network through which to transfer experiences, information, and materials. Plans are in order to strengthen these newly forged interorganizational ties. Over time, the characteristics of the network members and of the network itself will change. I believe that these changes will have effects on the success of the various literacy agencies and on the overall efficiency of literacy delivery in Haiti. Using ethnographic evidence and research materials gathered from meetings with the various literacy agencies, I will describe the currently changing network of literacy agencies in Haiti, paying attention to structural factors such as centrality, tie strength and multiplexity. I will then go on to suggest what structural changes can be expected with the proposed strengthening of ties between these agencies. Finally, I will discuss the impact of a suggested non-governmental coordinating agency on the newly formed network in Haiti.

G4—Global Village (Barry Wellman)

Transnational Migration or Settlement? Social Networks and Middle-Class Chinese Immigrants from Three Sending Areas

Janet Salaff
University of Toronto

We are conducting in-depth interviews of a number of middle class PRC, Taiwan and Hong Kong Chinese in different stages of migration. Whereas some have settled, others re-migrated, leaving economic and reproductive households in two lands, constructing a "social space" that traverses national boundaries. Conceptually, we ask is re-migration a temporary solution to settlement problems that can be ironed out? Or are we witnessing the formation of a transnational Asian middle class? We find that the two are linked: social network structures contribute to settlement problems. Social networks also give rise to a diasporic Asian middle class.

Does Race Matter in Relations Among Neighbors?

Barrett A. Lee
Pennsylvania State University

This paper draws upon traditional and network analytic treatments of community to investigate racial variation in neighbor relations. Multiple dimensions are identified along which African Americans' and white Americans' ties to their neighbors can be compared, with hypotheses about each dimension derived from compression, avoidance, and composition theories. Data from a Nashville, Tennessee survey show that (1) blacks' neighbor networks are more spatially proximate and made up of stronger ties (in terms of intimacy, duration, and contact frequency) than whites' are, (2) these differences persist after individual and site characteristics have been controlled, holding even in racially integrated settings, and (3) neighbors constitute a higher percentage of "helpers" in the total (spatially unbounded) support networks of blacks than of whites. The Nashville results agree most closely with compression theory, although similarities in the size, content, and multiplexity of black and white neighbor networks suggest that composition theory has merit as well. These results are discussed in light of the increasing racial and ethnic diversity of the U.S. population.

Inequality and Integration in Santiago, Chile

Vicente Espinoza
Universitat De Santiago De Chile

Having as a background the deep economic changes of the Chilean model of development during the eighties, I examine how these affected the social relations of two low-income neighborhoods in Santiago, the capital city. Data for the study were collected by using a personal network survey that considered 300 personal networks of women and men. The management of the household is a woman's task that involves combining different and unstable resources for their survival. Women develop a stable social network of kin and social contacts, that operates as a system of economic support: job-searching and monetary exchanges, child-care, homemaking, building, housing accommodation, and general sustenance to the family. Network members are usually located in the same neighborhood, and the alley is their natural territorial base. Networks of economic support are small in size: about eight members that usually have strong ties among them. The research found communities organized in small circles of strong ties whose base is the alley. Although this organization parallels an extended family, kinship is not its base. Social contacts among neighbors, friends and acquaintances in neighboring areas circulate resources, establishing horizontal communication between independent households. Formal organizations are systematically associated with exchanges in a mutual-aid system but do not act as a strong factor of social integration.

What the Analysis of Personal Networks Reveals about Articulations between Relational Systems in France?

Alexis Ferrand
University of Lille

In personal networks every tie is embedded in a network consisting of the same kind of ties which constitues a particular system. A multiplex relation (e.g., a friend is also a workmate) is an articulation between two widespread networks of friendship and workmate ties. A dynamic reading of these articulations is also possible when respondents are asked what kind of tie existed *before* the emergence of the tie currently under examination. A random survey of personal netwoks can be understood as a survey of forms and frequencies of articulations between relational systems and – then – provides informations to define some properties of the social structures (pattern of articulations between systems) of various 'milieus' or communities. Using several french national surveys the communication gives examples of insights such approach provides on french society.

Networks in the Global Village

Barry Wellman
University of Toronto

This is the first book to present a wide range of scholars who have used social network analysis to study community. It goes beyond just documenting the existence of supportive community networks that task has been well-accomplished to analyzing the implications of these community networks for the societies in which they are embedded. The trick is to treat community as a social network rather than as a place. Using this social network approach allows the authors in this book to study people's sociable and supportive community ties with friends and relatives, no matter where they live: across the street, across the metropolis, or across the ocean. The principal defining criterion for community is what people do for each other and not where they live. The book is organized as an around-the-world tour. Each chapter has been written especially for this book by natives of the countries studied so that we can assess how community networks operate in different societies. It is the first book to bring together analyses of communities from around the globe, presenting original research from eight countries in North America, South America, Europe and Asia as well as from cyberspace. Until now, most research has gone into documenting the composition, structure and supportiveness of community networks in North America. Despite the unfortunate habit of assuming America is the world, the nature of community networks in the rest of the world has not been clear.

P4—Friendship (Frans Stokman)

Longitudinal Data Analysis on Friendship Network Formation of Japanese Students

Hiroshi Hiramatsu
Konan University
Frans Stokman and Evelien Zeggelink
ICS, Groningen University

In the paper we present the analysis of friendship formation among Japanese freshmen in sociology, anthropology and social history at the Konan University. We analyze the effects of differences in attributes, behavior, and opinions on the formation of friendship ties and thus provide a first test of the models developed in F.N.Stokman & E.Zeggelink(1998) and E.Zeggelink, F.N.Stokman & H.Hiramatsu(1998). As a similar study was held among sociology freshmen at the University of Groningen, important differences between friendship formation in Japan and the Netherlands will be highlighted. Important results are: In the process of acquiring information of the other person, some characteristics such as gender, age, club membership, and communicational abilities are important for selecting friends. Some behavioral factors such as chatting, meals, drinks, concerts, and traveling, are very important for friendship formation in Japanese student, whereas they are less important in the Netherlands. The number of 'real ' friends that a student wants to have is at most 4, but the number of 'common' friends is at least 5. The number of friends increases over time, particularly in the first two months. The mean number of friends increases from 4.3(s.d.1.9) to 6.2 (s.d.2.7). Japanese students have been gradually thinking that sex is not so important for friendship formation (over half of students respond that 'sex is not important for friendship), but the actual friendship networks of our students are perfectly divided by sex. Friend rates of opposite sex are only 3 or 5%.

Determinants of Friendship Formation: a Comparative Analysis of Friendship Formation among Freshmen in Japan and the Netherlands

Evelien Zeggelink
Groningen University
Hiroshi Hiramatsu
Konan University
Frans Stokman, Marijtje Van Duijn, and Frans Wasseur
University of Groningen

In the literature on friendship, reciprocity and similarity of characteristics are seen as the two most important determinants for friendship. Aspiration and complementarity are seen as two other, less important, attraction forces for friendships. In most studies, similarity among friends is studied on the basis of gender and age and at most a few attitudes, but a systematic study on the importance of characteristics for friendship is lacking. In this paper, we systematically investigate the importance of characteristics, behavior, and personal orientations for friendship formation among freshmen, making use of a longitudinal study among sociology students in Japan and the Netherlands. We do this analysis in two steps. In the first step, we investigate differences of importance of characteristics over time and between the two cultures with the p2-model (Van Duijn and Snijders 1996). The p2-model is a logistic regression model on dyadic dependent variables (in our application a friendship choice). The p2-model makes it possible to investigate the effects of variables on making choices, receiving choices, on the density of friendship choices and on the reciprocity of choices. Candidates for effects on making and receiving choices are, among others, gender, smoking, playing music, religion, orientation towards the study, orientation towards going out and making fun. Candidates for effects on density and reciprocity are absolute differences in values on these variables, representing similarity. In separate analyses for each wave in each country, we first investigate the bivariate effects of these and other variables on friendship choices. Significant bivariate effects are subsequently used in a multivariate analysis. First results indicate that over time more (invisible) characteristics and orientations become important. We also find important cultural differences between Japan and the Netherlands. In the second step, the results in the previous analysis are combined with the notion that individuals differ in the importance they attach to characteristics of their friends, also within their freshmen group. This part of the paper aims to provide a first test of the dynamic friendship models as developed by Stokman and Zeggelink (1998) and Zeggelink, Stokman and Hiramatsu (1998).

Balancing Acts: The Foundation of Friendship Structure

James Moody
UNC-Chapel Hill

Past research has contended that friendship network structure results from an individual preference for transitive relations and an avoidance of intransitive relations. However, the potentially spurious relation with focal organization and dyadic attribute homophily complicates identifying such tendencies empirically. Based on new data from the National Longitudinal Survey of Adolescent Health (Add Health), which provides a national sample of large, jr. high and high school friendship networks, I test competing theories of friendship structure. After first describing the general relational patterns found across the Add Health schools, I then test multiple explanations for the observed friendship structure. Based on dyadic logistic regression models that account for the potential spurious effects of school organization and dyad attributes, I find a strong balance component for friendship choice.

The Effects of Strong Ties on the Likelihood of Being Disliked

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Louisiana State University

Much research has addressed the dynamics of positive affect but little attention has been given to negative affect. Extant literature on disliking and related topics (e.g., stigma) focuses on the cognitive and affective processes that produce disliking. By contrast, the present study clarifies how social structure influences being disliked. I posit that (1). information flows most efficiently in networks whose participants are densely interconnected, and (2) individuals with strong ties tend to provide each other more support than individuals with weak ties. Thus, in groups whose participants are densely interconnected, individuals who have many strong ties tend not to be disliked. Tie strength has little effect on the likelihood of being disliked in groups whose participants are sparsely interconnected. Twenty-five different campus activities reported in Walter Wallace's Midwest College data were examined for this study. The findings show that in dense networks, having associates who have positive feelings about you reduces your likelihood of being disliked by the other members of the group. In less dense networks, having associates who have positive feelings about you does not affect the sentiments of the other group members.

TL1—Interorganizational (Stephen Pryke)

Who Interlocks With Whom? Competitive Uncertainty and Status-Homophily in Markets For Interlocking Directorates

Michael Jensen
Northwestern University

This paper proposal suggests that firms use interlocking directorates to reduce the uncertainty derived from direct competition among themselves by initiating and reconstituting interlocks that reproduce their interlock position among blocks of status-equal competitors. The main argument that initiation and reconstitution of interlocks are more likely to occur within than across status sets consists of three parts. First, it is argued that interlocking behavior represents competitive social moves that create uncertainty among firms in competitive relationships. Second, it is argued that interlock networks reflect equilibrium structures in markets for interlocks; however the value associated with the interlocks themselves is highly uncertain and forces market participants to evaluate interlocks in terms of their status. The potential advantages associated with the interlocks force firms to monitor each other's interlocks to secure comparable worth. Finally, it is argued that the statuses' differential values create differential incentives to protect and reproduce the statuses, thus suggesting that the tendency to initiate and recreate status equivalent interlocks may be stronger within some statuses than others. The empirical context used to test the status-homophily hypotheses is the market for financial interlocks pharmaceutical firms faced from 1980 to 1997.

Social Network Perspective to Inter-Firm Link-Formation: A Review and Some Propositions

Zeki Simsek
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Why do firms form links with their competitors? Social network perspective focuses on network-related reasons and conditions that proceed these links, while majority of theories as transaction cost economics and resource dependency focus essentially on organizational motives driven by efficiency and adaptation concerns. Positing networks as both enabling and constraining determinant of future actions, social network research typically addresses link-formation by using either ego-centric network or global network properties as unit of analysis, but seldom both. In this paper, I summarily review the two approaches and then advance some propositions when both are considered simultaneously, arguing that this new approach proves useful for understanding of the interplay between ego-centric networks and global networks. I further argue that the interplay is significant yet largely goes undetected in the extant literature because of research tradition of using only one unit of analysis. Next, I submit that concept of organizational population as employed by the organizational ecology literature is better suited than is organizational field to draw boundaries of a network and to examine link-formation among only competitor organizations. Finally, I call for utilization of such mid-level concepts as strategic groups and niche-crowding to further our understanding of the interplay between competitive organizational strategies and link-formation patterns and the dynamics that underlie both ego-centric networks and global networks.

The Construction Process as a Transitional Transaction Network: An Investigation into the Effectiveness of Non-Contractual Forms of Governance in the UK Construction Industry

Stephen Pryke
University College London

The aim of this research is to use Social Network Analysis to analyse the effects of various new organisational forms introduced into the UK construction industry in response to recent critical reports following two, government sponsored, reviews. The construction project may be viewed as a multi-layer of transaction networks comprising communication, economic and influence networks (Tichy et al 1979). These resource flows are featured in several different governance systems found within construction project organizations: (a) Contractual conditions "Governance Modifiers" - systems introduced in parallel with standard contractual conditions to modify the bahaviour of the players: examples of these would be partnering and supply chain management; (b) Custom and practice within the industry - the basic assumptions relating to power, status and information flow routes, which underpin the philosophies encapsulated within the range of standard contract documents currently in use, have their roots in the Nineteenth Century and no longer accurately reflect the location or destination of information and knowledge required to complete a construction project. It is the lack of correlation between the three transaction networks which causes an apparent resistance, or inability, to change. This cross disciplinary research project is partially complete and the results of one detailed case study are available. Efforts have been made to devise a form of graphical presentation which allows a more accurate representation of organisational hierarchies and to enable contractual networks and organisational management networks to be easily compared.

A1—Cognitive (Greg Janicik)

Communication, Semantic, and Interpretation Networks: A Longitudinal Analysis of Project Groups

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UNC Charlotte
Thomas H. Feeley
SUNY Geneseo

This project is an analysis of the communication networks and members perceptions of their group experiences over five points in time. Zero-history groups worked under high pressure task deadlines and at each point in time reported (1) their communication with other group members and system members, and (2) their perceptions of their experience via open ended questions. Qualitative data were analyzed with interpretation network and semantic network analyses. Theoretically, this contributes to research based on communication group processes. The effects of groups midpoint transition (Gersick, 1988) is tested with both communication and semantic network analysis. Methodologically, the research considers three different measures of associations among members, including communication networks, semantic networks, and interpretation networks. The communication networks were measured with traditional who-to-whom rosters; the semantic networks were based on overlapping communication of concepts by network members; and the interpretations networks were constructed based on the extent to which members responses were similarly categorized with a traditional content analysis. Analyses were conducted on (1) group process via network analysis; and (2) the different types of networks and their relationships to each other.

The Rise of the Intellectual Diaspora Networks: Social Identification and Cognitive Associations

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Institute of Research for Development and University of Cape Town

A significant number of countries have recently developed networks of highly skilled expatriates, in order to expand the knowledge base of their national community. These interesting experiences are usually designed to facilitate concrete activities and circulation of resources among actors located in different parts of the world. Internet is obviously a major communication device in creating links between these people. However, exchange of information does not generate action by itself. The challenge is thus to set up appropriate social and technical forms to allow the flows of competencies in an effective manner. The paper presents the diaspora networks experiences, discusses socio-technical options raised by some of them and aims at sharing conceptual as well as methodological insights with participants.

Personality and the Perception of Social Networks: Examining the Big Five

Gregory A. Janicik
Texas Tech University

Prior research suggests that one's surrounding social network affects interpersonal perception. For example, recent social psychological studies have demonstrated that various dimensions of an individual's social network often influence his or her perception of others' personalities in a given setting. However, the other side of this issue is rarely addressed – does personality influence the perception of social networks? There is reason to believe that differences in personality contribute to how an individual assesses a social network. For example, an analysis of the contingent association between personality and network structure found that personality does vary with the number of structural holes that individuals identify in their network (Burt, Janotta and Mahoney, 1998). This paper extends the search for connections between personality and the perception of networks by proposing that certain individual-level traits affect the ability to perceive differentiation in the closeness of relationships among others. The research focus is on the Big Five factor structure of personality and its relationship to network perception. Preliminary evidence suggests that individuals scoring high in Agreeableness tend to perceive a high level of density in both familiar and unfamiliar social networks. The issue of causality as well as the implications of the findings are discussed.

CP1—Health
(Jane Holschub)

Community Health Nurses as Strong-Weak Ties: Findings from an Ethnographic Study on Communication Between Nurses and the Elderly at Neighborhood Clinics

Karen E. Pettigrew
University of Michigan

Since the publication of Granovetter's (1973, 1982) strength of weak ties (SWT) his theory has been tested in varied settings. Most research, however, has employed quantitative methods of data collection and analysis. In the current study an ethnographic approach was used to determine whether SWT might account for the flow of human services information (HSI) among community health nurses and the elderly at neighborhood clinics. It was expected that the nurse is a weak tie who provides HSI not available through strong ties, but that the senior would not use her information without first conferring with family. Field observation of 24 nurses working with 108 seniors at 30 foot clinics yielded 24 dyads for detailed study. Each incident of nurse information-giving was followed by independent, in-depth interviews with the nurse and with the senior, and again with the senior two months later, to elicit accounts of the information-giving process. Where tie strength was based on "closeness" (along with other indicators), the study revealed that nurses were indeed weak ties who played a crucial role in linking seniors with local services. However, they provided this information in a caring manner characteristic of strong ties, which suggests nurses occupy a hybrid network position as strong-weak ties. Evidence also revealed that HSI helped seniors in diverse ways, but that seniors followed through on only 20% of referrals and tended not to consult strong ties first. Nurses devised various strategies for disseminating HSI according to their assessment of the senior's needs. The clinic setting emerged as an"information ground" for the informal sharing of information about human services. This research elaborates on Granovetter's theory and provides insights into the information behavior of seniors and health professionals.

The Effect of Social Networks on Compliance with Mammography Guidelines

Ann Boulis and Ross Koppel
University of Pennsylvania

Although the quantity of research on the determinants of participation in routine health prevention examinations is large, the theoretical depth of this literature is relatively limited. Much of this work is atheoretical or based on the rational actor paradigm. This paper focuses on the role of social networks in the process of deciding whether or not to seek or avoid one particular health service, screening mammography. It draws on evidence from six focus groups and 10 semi-structured interviews with lower income and medically indigent women to examine the role that significant others play in creating both women's beliefs about the general utility of mammography and their willingness to seek out the service given their financial constraints. Results reveal that within social networks women express ambivalence over the general utility of mammography and confusion over whether to seek the service. Although significant others influence women's views on the general utility of screening mammography, they appear to play an even more major role in constructing women's thoughts on the value of actively seeking the procedure. The ultimate influence of significant others may depend on individual women's past life experiences and current outlook.

Using Sociograms of Health Networks within Churches to Identify Opinion Leaders

Lené Levy-Storms
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Church-based programs that promote the use of mammography screening have used lay health advisors and have depended on reputational approaches to identifying them. The purpose of this paper is to propose a structural approach to the identification of lay health advisors or opinion leaders. Data come from a survey of 290 older (age 50+ years) Samoan women who attended 40 randomly sampled churches in Los Angeles County in 1996-97. The networks derive from questions on whom the respondents talk to about general health, female health, and breast cancer. Of these 290 women, 145 (50%) of the respondents were connected to other study respondents. The results show how innovativeness occurs on the periphery of the church networks, the most central adopt not much earlier than the average adoption time of church networks with at least 50% adoption rates, sequential linkages between earlier vs. later adoption times, and larger numbers composing the late adopter groups. These findings support theory on opinion leaders, contagion, and critical mass as playing influential roles in diffusion. The implications of using structural vs. reputational approaches to identify opinion leaders for future lay health advisor interventions will be discussed.

G1—Homophily
(John Skvoretz)

On the Gendering Influence of Environment on Social Network Construction

Christa Schmalzhaf-Larsen
Universität Essen

How girls and boys, in similar or dissimilar ways, are tied into communities through their social networks has already been the subject of several studies. Here, a change of perspective has been undertaken, in that the possible gender-specific influence of the (social) environment on the construction of their social networks will be illuminated. Environment is considered here as an opportunity structure for the construction of social networks. Data from 957 children and youths from a representatively selected sample of 39 areas of western Germany show that schools, the street, clubs and homes represent for girls as well as for boys opportunity structures for the construction of social networks. However, in connection with local specifics a gender-differentiating effect of these opportunity structures can be partially shown, which is in turn reflected in the social networks of girls and boys. This research's importance can be seen in that the construction of social networks is not foremost determined by the personal capabilities of girls and boys, rather, that the social environment's possible influence is considered. This can open future perspectives for the socio-political patterning of this social environment.

Job Homophily and the Quality of Work: Bias in Manager Peer Evaluations

Ray Reagans
Carnegie-Mellon University

A recent development in homophily research describes how the homophily effect observed on social relationships is a simple sum of three unobserved components effects: an intrinsic component due to homophily, a positive effect due to legitimation, and a negative effect due to competition. Legitimacy and competition vary with the amount of homophily in a surrounding reference population to define a predictable homophily effect: (1) Homophily bias is positive between minorities. (2) The positive effect turns negative as the minorities increase to a plurality. (3) The negative effect approaches zero as the plurality increase to a majority of the reference population. In this research note, I test the three predictions among senior managers in terms of the job that the managers perform. Analysis shows that reliability is the dominant effect (in the sense that individual evaluations correlate with aggregate evaluations), but the predicted homophily effects are a significant component in the evaluations. A manager with a unique job provides his similar colleagues with disproportionately positive evaluations. The positive effect turns negative as a senior manager's job becomes less unique (e.g. as other senior managers begin to crowd his position in the reference population). Work in the firm is sufficiently diverse such that the majority condition is not observed. I conclude that homophily is less a quality of what two managers have in common and is more a quality of the social context in which similar managers work.

Tau-bias and Rejection Models for Intergroup Association: An Examination of Intermarriage in the United States, 1980-1990

Chang Young Chung and John Skvoretz
University of South Carolina

We replicate and improve upon Peter Blau and his colleagues' empirical study of intermarriages among young metropolitan area residents in 1970 (See Blau and Schwartz: 1997). In our study, we develop two different mathematical models, which explicitly formalize the part of Blau's structural theory most extensively studied: Heterogeneity Theorem and Multiform Heterogeneity. The two models, tau-bias and rejection, are applied to analyze two latest U.S. census public use sample data sets of 1980 and 1990. We analyze intermarriages across nine important parameters of social differentiation: race, birth place, citizenship, ancestry, language, industry, occupation, education, and total personal income. Discussion of the analysis results is centered on three inter-related topics. First, we assess the overall model fit. In doing so, we compare two models each other and also verify Blau's theory. Second, we illustrate the pattern of intermarriages among young metropolitan area residents in 1980 and 1990, as reflected in the parameter estimates of the models. We also consider and advocate the benefit of the "top-down," or theory-driven, analytical strategy.

P1—Sampling & Estimation (Devon Brewer)

Sampling in Social Networks: Some Design and Inference Methods

Steven Thompson
Pennsylvania State University

Social links are often used in obtaining samples from social networks, either because the social network structure is of inherent interest to the investigators or because link-tracing procedures provide the only practical way to obtain a sample large enough for the study. Some recent results on design and inference methods for sampling from social networks will be discussed, with illustrations from studies of drug injecting and sexual behavior in relation to HIV transmission.

Prostitution Accounts for Most of the Gender Discrepancy in Estimated Number of Sexual Partners

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Heterosexual men estimate having had substantially more sexual partners than heterosexual women, on average (e.g., Morris, 1993; Smith, 1992). This finding is puzzling because in a closed population of heterosexuals, men and women actually have the same number of sexual partners in the aggregate. We used data from the General Social Survey (GSS) and a study of prostitutes, drug users, and their sexual, drug, and social contacts in Colorado Springs (USA) to examine possible reasons for the disparity. Many researchers attribute the gender discrepancy to heterosexual men who estimate having had a large number of sexual partners. Our results show that these men are more likely to visit prostitutes and have proportionally more sexual partners who are prostitutes than other men. However, prostitute women are underrepresented in the GSS. Once their undersampling and very high numbers of sex partners are factored in, the gender discrepancy becomes almost negligible. These results suggest that reporting and other biases have a minimal or no role in the disparity.

TL2—Visualization (David Krackhardt)

Partitioning Approach to Visualization of Large Networks

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University of Ljubljana

Some approaches to partitioning in large relational networks will be presented: (a) connectivity based partitions -- standard concepts from graph theory (components, cliques, k-cores, etc.); neighbourhoods of central vertices; hierarchy of similar graphs; and, (b) neighbourhood based partitions -- cluster is a set of units with similar neighbourhoods (degree partition, regular partition, etc.). The obtained partitions are used for visualisation of given network (analysis of main core and residual graphs, shrinking the main core, deleting the main core, reordering the relational matrix). Some illustrative examples will also be presented.

IKNOW: A Visualization Tool to Assist and Study the Emergence of Social and Knowledge Networks

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Because information transacted over electronic media such as the Web can be stored in digital form, a new generation of software called "collaborative filters" or "communityware" can be used to visualize a community's social and knowledge structures. One such tool, IKNOW (Inquiring Knowledge Networks On the Web; http://iknow.spcomm.uiuc.edu/), has been designed by a team of UIUC researchers to assist individuals to search the community's databases to automatically visualize and answer questions about the community's knowledge network, that is, "Who knows what?" as well as questions about the community's cognitive knowledge networks, that is, "Who knows who knows what?" within the community's. Unlike traditional web search engines that help an individual search for content on the web, tools such as IKNOW search for, and visualize, content and contacts (direct and indirect). In addition to being instantly beneficial to users, they also provide the researcher with an opportunity to unobtrusively study and visualize the influence of these communityware tools on the social structure within communities. This paper explores the rationale behind the design of one communityware tool, IKNOW. Next it reports on how several work and social communities are using IKNOW.

Using ONA to Improve Teaming and Communications in IBM

Gerry Falkowski and Sheri L. Feinzig
IBM Corporation

This paper discusses how we used Organization Network Analysis (ONA) to improve teaming and communications within IBM's "fulfillment" operation, a sprawling enterprise that employs 30,000 people in 122 countries, and handles the paperwork and shipping logistics for some 14 million customer orders yearly. In September of 1996, we were asked by senior management to help pinpoint where the formal organization is and is not working as intended, and points to specific action that can be taken to improve the effectiveness of the fulfillment team. During 4Q96, we set out to test this hypothesis: Worldwide Fulfillment had multi-directional communication, an effective decision-making process, and the means for creativity and innovation to flourish. We started out by using ONA in two ways at IBM. First, we used ONA to benchmark the best practices of 15 companies that had also undergone a similar business transformation. This best practices study focused on identifying those things that were integral parts of these companies' business transformation efforts. For example, a high sphere-of-influence score--that is, the average number of employee connections in the company's informal network--was considered a key indicator of success. Based on this sphere-of-influence score, IBM fulfillment ranked in the bottom third of the studied companies in terms of overall organizational effectiveness. This by itself clearly indicated that IBM had to make some changes if Worldwide Fulfillment re-engineering was to succeed. By mapping Worldwide Fulfillment's work interactions and information exchanges both within the department and with the department's key constituents within other parts of IBM, we discovered that: nearly a quarter of Worldwide Fulfillment employees were not connected to or communicating with their colleagues; a third had little or no input on decision making; and nearly half (44%) had no opportunity to provide input into new ideas. Even the 56% of team members who did have input on new ideas did so in so fragmented a way that their effectiveness was limited. Based on our findings, we facilitated a series of workshops designed to use ONA visualization techniques to gain insights and then developed an action plan. During 4Q97 we conducted a second Organization Network Analysis to gauge progress based on actions taken and found considerable improvement in teaming and sharing, as well as additional opportunities for continued improvement.

A2—Information & Communication (Anabel Haase)

Applications of Social Network Analysis to Information Studies

Anabel Quan Haase
University of Toronto

In this paper, social network analysis will be described and its relevance to information studies will be discussed. Social network analysis is an approach to the study of social structure, where social structure is defined as patterns of relationships among individuals. Given that social network analysis is a powerful approach, researchers have begun to use the approach when addressing research questions in information studies. There are two general ways in which social network analysis can address questions relevant to information studies. First, social network analysis can be used to study individuals or groups in information studies. To date, social network analysis has not been applied to study individuals or groups in information studies. Thus, social network analysis could be used to study communication patterns among librarians or among researchers in information studies. However, social network analysis has been applied to study groups in other scientific fields; for example, social network analysis has been used to study communication patterns among researchers in a computer science group (Haythornthwaite, & Wellman, 1998). Second, social network analysis can be used to study more fundamental issues relevant to information studies. While the use of social network analysis to fundamental issues in information studies has been limited, studies in several research areas have been conducted. This paper will focus on three areas in which social network analysis has been successfully applied: communication networks analysis, Information and Communication Technologies (ICTs), and scholarly communication patterns.

The Dynamics of Triad Formation

Kathleen M. Carley
Carnegie-Mellon University

It is common place to think of information as flowing through and being constrained by the underlying social networks. It is also fairly common to think of humans as learning new information when they interact with others. These ideas were previously combined in a dynamic theory of individual and socio-culture adaptation called constructuralism. This theory was operationalized as a computational model. In this model individuals were treated as passive receptors. As gathering information when they interacted. However, we know that individuals are also, at time active in their search for information. This paper asks, what difference does passive versus active information seeking on the part of actors make on the rate of diffusion and change in the underlying social network. Computational results suggest that one of the key differences is in the formation and maintenance of ties and triads.

Communication, Belief Change, and Membership Maintenance: A Process Model of Networked Social Structure Development

Brian Butler
University of Pittsburgh

Voluntary electronic collectives, in which a networked infrastructure enables bounded many-to-many communication, are common social structures in online contexts. Like other social structures, features of these collectives develop over time. However, because existing development models typically do not consider particular communication mechanisms and processes, they provide little insight into how different communication infrastructures will affect the development of these structures. This paper integrates individual belief change and member movement in a dynamic model of voluntary collective development. Messages create a composite signal, providing members with information about the collective. This information changes beliefs; those beliefs serve as the basis for individual's evaluation of membership. Communication costs, a feature of the communication infrastructure, affect a collective's development by moderating the process of member belief change. This cycle of communication, belief change, and membership maintenance underlies the development of online social structure. To develop this theory of voluntary collective development, a dynamic, multi-agent computational model was implemented, empirically validated, and analyzed. The results imply that reduced communication costs, as are expected in networked environments, slow down the development process, resulting in voluntary collectives which have more (and more diverse) members while also being less stable than traditional face-to-face associations.

Individually Oriented or "Culturally" Oriented Friendship Patterns?

Ainhoa de Federico de la Rúa
Univesité des Sciences et Technologies de Lille

In Sitges V European Conference on Social Networks A. Ferrand and I presented an analysis on the change/stability of distant quasi-synchronic friendship networks caracteristics. We presented the comparison of characteristics of two friendship personal networks created by individuals before, and four months after having moved in similar contexts. Individuals were short term (3 to 12 months) foreign exchange students from several European countries who describe their friendship network in their home country and their new friendship network in the host country. The analysis showed that the two quasi-synchronic friendship networks were functionally independent and formally homologous. Data seemed to suggest that, in a short term, individuals have tendency to create networks in a similar way. The question explored in this presentation is to what extent are these tendencies individual or oriented by national socialization. In other words, to what extent people from different European countries describe similar or diferent friendship networks? Formal network characteristics studied are size, density, social contexts of meeting. Ties characteristics studied are sex, age, frequency of meeting and relation multiplexity.

CP2—Aspects of Networks (Emily Agree)

Multi-Generational Exchanges in Taiwan and the Philippines: A Social Network Approach

Emily M. Agree
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Ann E. Biddlecom
University of Michigan
Thomas W. Valente
Johns Hopkins University
Ming-Cheng Chang
Taiwan Provincial Family Planning Institute
Aurora Perez
University of the Philippines Population Institute

In this paper we examine the exchange of resources among multiple generations in Taiwanese and Philippine families. We analyze two unique new datasets that provide comparable information on transfers in the family networks of older persons across two countries. These data bridge ego-centric and sociometric techniques because, though information collected about transfers is egocentric, we have a complete sociometric enumeration of family members. We will construct social network measures such as Exchange Activation (the number of ties through which resources are given and received); Valued Exchange Activation (the number of gross flows of money, material goods, and services and the multiplexity of currencies); Generalized exchange (the number of paths that redistribute resources from one member of the network to another through the respondent); and Intergenerational Activation (the number of pathways that redistribute resources across generations in the family through the respondent). Each measure can be calculated either as a count or standardized according to the size of the kin network. In a previous paper, we calculated versions of these network measures to examine parent-child exchanges. The present paper will extend our prior work by examining transfers across multiple generations, including middle-aged adults, and comparing exchange patterns cross-nationally.

Contemporary Management for Physical Therapists: Identifying Key Stakeholders

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J. Valentine
Florida Atlantic University

Physical therapy service units, like the rest of the health care industry, are facing a different health care arena than 5-10 years ago. Factors external to the actual physical therapy unit, such as managed care, changes in Medicare reimbursement, and other health care financing issues, are causing environmental turbulence for the physical therapy industry. This environmental turbulence affects the decisions made by physical therapy managers. As the internal, interface, and external stakeholders change position in the physical therapy arena, they hold different amounts of influence and power. This study surveyed over 1300 physical therapy service unit managers of hospitals, long term care facilities, outpatient clinics, and home health agencies to determine whom they perceived as the most important stakeholder to their physical therapy service unit, and to determine the perceived degree of power the various stakeholders had over the physical therapy service area. This study indicated that historical roles and alliances in health care are undergoing major changes. The physician is no longer considered the major stakeholder, and the perceived power of the major stakeholders has also changed. This study maps the key stakeholders for the physical therapy service units, discusses changes in power, and provides a framework for physical therapy managers who seek stability and predictability with their stakeholders.

The Structure of Anarchy: Political Ideology and Organization on the World Wide Web

Ken Palmer and Lynn Owens
UNC-Chapel Hill

Despite the abundance of social research on computer mediated communication, few sociological studies have focused on the World Wide Web. Using data we have collected on the entire population of anarchist political sites on the web and the links between them, we treat the web as a network of relations of both ideas and actors. We use social network methods to analyze these data from two perspectives: First, we conceptualize our data as an anarchist 'hypertext' document existing in cyberspace, simultaneously accessible from disparate geographic locations. Hyperlinks connecting sites structure the text, creating the paths through which the reader navigates. We make a core-periphery argument, asserting that informational hierarchies emerge based on the patterns of inter-linking between anarchist sites. Second, we conceive of links between data points as social relations. By focusing on sites detailing non-web activism, we examine anarchism as a social movement. From this perspective, we can look at the manner in which actors in the anarchist milieu relate to each other through a new communications technology. Here we show how geography, language, and the content of sites interact to structure the links and connections between groups and individuals on the web.

Intraorganizational Networks: Gender and Participation on the Threshold of Third Millenium

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Sociologists study work organizations by looking at both the structure and the culture of the organization. Many problems women in modern business-organizations are facing turn out to be the result of the business culture predominant in this or that organizations and the patterns of interactions. This culture is closely connected with the classical theories of organizations, based on the rational concept. The paper poses the following questions: What is women's role in the intra-organizational networking How do we explain historical change in women's labor-force participation? What is the intra-organizational status of women at the end of 20th Century? My study is based on targeted interviews with women managers of companies and firms of different profile of the city of Novosibirsk. Women made it evident and proved it that the use of command-control style of administration, which is traditionally used by men in big organizations, does not necessarily lead to success. Women involve social impact assessment, they evaluate their achievements in terms of how well they manage to use the given opportunities, how they fulfill the creative ideas, also taking into account weather their subordinates are satisfied the work done or not. The respect of their colleagues is very important for them. Also is of a great importance is the atmosphere of friendship and coherence in the team they work with. Women contribute to intra-organizational networking by means of using skills and attitudes typical of women's behavior in this world and those that have got effective results in their life experience.

G2—Organizations (Walter Bien)

Internetworks: Group Network Measures of Internet Communication

Dean H. Krikorian
Cornell University

This paper builds upon traditional network measures and develops new measures based on the unique network structures inherent in Internet groups. As an example, Internet newsgroups, where individuals' post messages to the group as a whole, represent a completely connected one-to-many network. This form of network structure clouds previous distinctions between individual and group network measures. For example, Sabidussi's (1966) index of closeness, or the inverse relation of the sum of geodesic distances between actors, has little practical application on Internet newsgroups, as all actors have the same geodesic distance (i.e., all are "reachable"). Furthermore, computer-mediated group communication demands new forms of network measures such as inter-group and intra-group threads (i.e., linked or"replied-to" messages), in addition to reframing traditional measures of connectedness (i.e., degree centrality). The paper describes the formulae used to generate standardized measures of group Internet communication (or "Internetworks"). Such measures can help describe computer-mediated group communication networks and have the potentially valuable feature of direct application to digitally-archived databases (i.e., they can be programmed as algorithms). Examples from a variety of on-line groups illustrate the applications of these measures. Implications are discussed in light of future theoretical development in virtual network communities (Wellman & Gulia, 1998).

Network Analysis Goes Socionic Or: How Can Networking Processes Be Modeled by Artificial Social Systems?

Walter Bien, Peter Mutschke

The question, how social agents develop the willingness to cooperate, is a key problem both for the distributed artificial intelligence (DAI) and for the sociology. In multi-agent systems (MAS), a special branch of DAI, up to yet only systems with few agents and simple social models were examined. To develop powerful algorithms in DAI, it is necessary to model more complex models in artificial systems, e.g. socially coordinated problem solving behavior as we can obtain from social reality. This is the aim of a new interdisciplinary research approach 'Socionic'. In looking for specific problem areas, scientific communities are in almost ideal manner suitable to be an application domain for such research perspectives. They do not only indicate a set of characteristics, which are central in MAS (multiplicity of heterogeneous agents, decentralized decision-making processes etc.). Moreover, as scientometric investigations have shown, the choice of subjects and cooperation partners seem to be strongly influenced by the social coherence of a research field and the degree of integration into cooperation networks of the involved participants. Those cooperation strategies have even (at least on the macro level) a certain degree of "predictableness"and thus operationalizability for MAS. Network theory, on the other hand, gives information about structure attributes and therefore the context and the borderlines in which agents could act. Simulation of network based social systems by artificial multi-agent systems, or multi-agent systems ruled by laws based on network theory will trigger both social science and DAI research.

Prominence versus Autonomy: Rank Dependent Effects of Intraorganizational Networks

Michael Jensen
Northwestern University

This paper proposal suggests that the effects of particular intraorganizational network structures on managerial performance depend on managers' rank in the formal organization hierarchy. It suggests that autonomy networks are more effective for lower ranked managers than prominence networks, whereas prominence networks are more effective for higher level managers than autonomy networks. The argument is that the type and amount of uncertainty change across ranks. At lower levels there is less uncertainty and it is internally focused, whereas at higher levels there is more uncertainty and it is externally focused. The information and control benefits of autonomy networks are particularly valuable for lower ranked managers as they help managers increase their discretion over their job functions providing them an avenue to differentiate themselves from other managers. Higher level managers already have high levels of discretion. Their main problem is to control the implementation of the projects they initiate and delegate to others. Prominence networks provide managers with extensive structural control over others' activities, thus making the implementation of projects easier. The paper contributes to previous research on intraorganizational mobility and performance by explicitly focusing on internal networks and the changing role of uncertainty across ranks.

P2—Theory (Joseph Whitmeyer)

A Deductive Approach To Associational Networks

Joseph Whitmeyer
University of North Carolina, Charlotte

I use an actor model together with scope conditions and occasional additional assumptions to derive theory concerning structures of associational networks. Deductions concern characteristics of those networks, and the structures that are likely to form and to be stable. For example, complete networks are possible up to size 5, with the tetrad much more stable than the triad (confirming an insight of Simmel (1902)). Regular networks (i.e., in which each actor has the same number of associates) of indefinite size are possible, such that segments of these networks are empirically likely. One such segment is identified in an empirical friendship network studied by Krackhardt (1987). A deductive approach thus suggests features to look for in naturally occurring associational networks, and provides explanation of such features when found.

Neither Action nor Institution: Networks as Generic Types of Social Structures

Wolf Heydebrand
New York University

To move beyond its status as a method of analysis and to establish an autonomous niche within sociological theory, a theory of social networks must construct analytical boundaries to distinguish itself from competing conceptions of social action and social structure. Such an analytical framework would, as a minimum, have to define the differences between networks and types of social action and social capital, on the one hand, and types of social institutions, on the other. The paper explores the multiple definitions involved as well as a number of analytical contrasts between networks and institutions, such as independent variations in the degrees of institutional patterning and organizational elaboration. Theoretical approaches with an affinity to the network perspective are identified, such as theories of rationality, libertarianism, the anarchist theory of organizations, alliances, and federations, theories of social movements, theories of social power, and sociological theories of emotions, gender, and deviance. It is argued that a structural network theory need not be a culturally agnostic and behavioristic theory of social action and structure, that it opens up the explanatory options available to sociology, and that it enables theories of social action and institutions to move from conceptual models to testable theories by providing the indispensable conditions of negative evidence and falsifiability. Some empirical examples of the role of social networks in institutional change are cited for the 1989 transition in Eastern Europe and the subsequent new phase of globalization.

A Framework for Policy Decision Making Simulation

Reinier van Oosten
Decide bv. the Netherlands

Since 1990 a number of models have been developed by researchers around Frans Stokman. To name a few of those models: The two stage model of Stokman and van den Bos, the exchange model of Stokman & van Oosten, the friendship model of Zeggelink, the strategic model of Stokman & Stokman. All of these models have been implemented on top of a developing object oriented software framework. A new framework with expanded possibilities has been defined and will be implemented in the near future. This framework will support the development of a new generation of models for simulating policy decision making. The framework will be augmented with groups. All relations between actors, groups, issues, actors and issues, actors and groups and groups and issues will be supported by this framework. Also the architecture of the principal elements and the simulation control will be discussed. The aim of the presentation is to discuss the framework with potential model builders and their supervisors in order to show the possibilities and to enhance the functionality.

Papers In Absentia

Certain Response Effects in Surveys of Informant Personal Networks

Eugene C. Johnsen
University of California, Santa Barbara
Christopher McCarty and H. Russell Bernard
University of Florida
Gene A. Shelley
Georgia State University
Peter D. Killworth
Southampton Oceanography Centre

In a recent telephone survey, about 800 informants were asked how many they knew in each of 48 subpopulations of the U.S. This type of information is used in methods we have developed for estimating the sizes of hard-to-count subpopulations of a given total population. Of these 48, 32 were defined by a common attribute of its members (A-subpops) and 16 by a common relation of its members to the informant (R-subpops). Of the A-subpops, 12 were defined by a common first name and 20 by a common description of its members. The A-subpops were not designed to be mutually exclusive nor collectively exhaustive of informant's personal network. The 16 R-subpops, however, were designed to be both. Although estimates based on the A-subpops and on the R-subpops produced on first blush almost identical average personal network sizes, these estimates for individual informant's personal network sizes varied considerably. Further, the profiles of the individual response distributions for the A-subpops and R-subpops qualitatively differ. In distinction to attribute information about members of A-subpops, we believe that relational information about members of R-subpops is virtually free of transmission and barrier effects, so the almost equal estimates for average personal network size appear to be the result of various response effects acting on the different types of subpopulations. We analyze and discuss certain effects which seem to play a role, including rounding to prototypical values, telescoping, and those described as "availability", the "Restorff effect" and "regression -to-the-mean".

How to use...

SOCNET

Electronic Discussion Forum

SOCNET is a *listserv* list. A *listserv* list is essentially an automated mail forwarding system in which subscribers send e-mail to a central address and it is automatically rebroadcast to all other subscribers. The purpose of SOCNET is to allow network researchers worldwide to discuss research and professional issues, make announcements, and request help from each other. Subscription to SOCNET costs nothing and is available to all members of INSNA.

Joining SOCNET

To join SOCNET, send an email message to **listserv@lists.ufl.edu** that says the following in the first line of the body of the message: SUBSCRIBE SOCNET **<your name>**. For example:

SUBSCRIBE SOCNET Steve Borgatti

(Substitute your own name for "Steve Borgatti"; don't join the 3.3% of the membership that has subscribed with my name.) The *listserv* software at Florida will then add your name and email address to the list, and send you back a message confirming your membership. If you do not receive a confirmation message back, contact Steve Borgatti (borgatts@bc.edu).

Using SOCNET

Once you are a subscriber, to send a message to all SOCNET subscribers, just send email to the internet address

socnet@lists.ufl.edu

Your message will automatically be broadcast to all SOCNET subscribers.

Note: You must not try to send messages to the listserv from a different e-mail address than the one you subscribed with. If you do, the system will flag you as "spammer" and will send the message to me, the list manager, instead.

Options

To permanently remove yourself from SOCNET, send a message to **listserv@lists.ufl.edu** with the following command in the body of the message:

SIGNOFF SOCNET

Important note: this message, like all listserv commands, should be sent to the listserv (address **listserv@lists.ufl.edu**) and not to SOCNET. If you send it to SOCNET, it will not sign you off, and everyone on SOCNET will get a message from you that says "SIGNOFF SOCNET".

To see who else is subscribed to SOCNET, send the REVIEW SOCNET command to the listserv. You can have the list sorted by country, last name, node id and user id, if you like, by sending a command of the form REVIEW SOCNET (BY <fieldname> as follows:

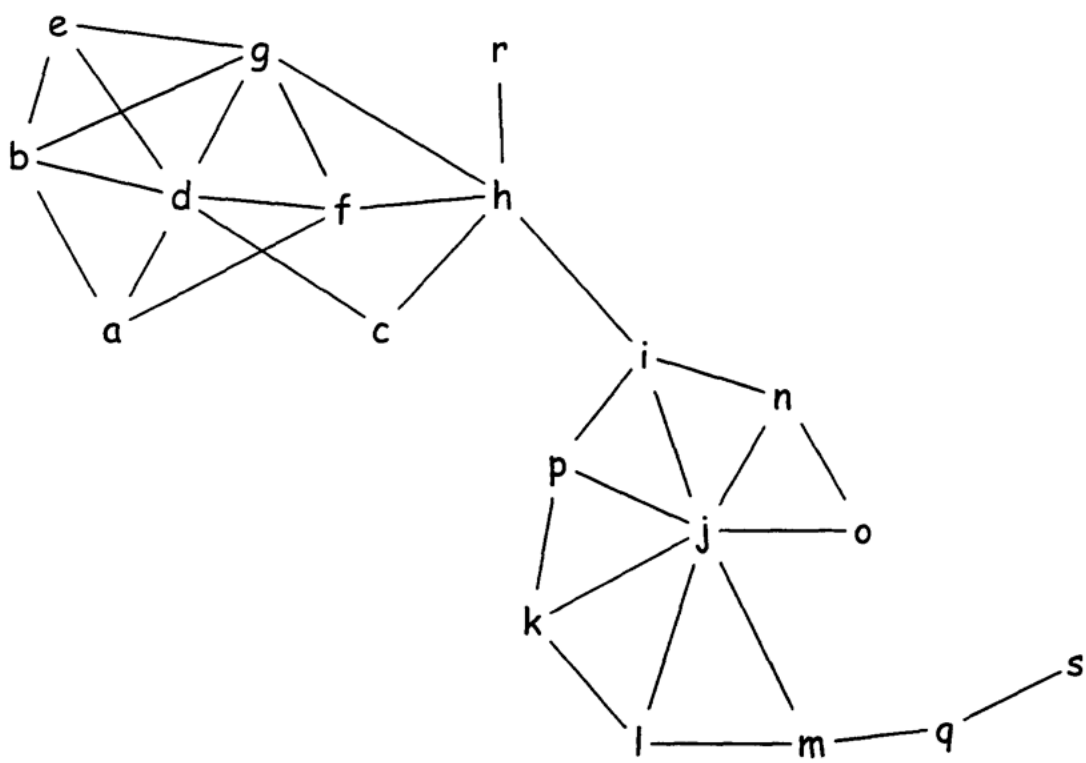
REVIEW SOCNET (BY COUNTRY
REVIEW SOCNET (BY NAME
REVIEW SOCNET (BY NODE

For information about additional commands, such as using the DIGEST option, send the command

HELP

to **listserv@lists.ufl.edu**. Again, don't send it to socnet or else everybody will get that message!

Four Distinct Aspects of Centrality



Nodes with the <u>highest</u> centrality:

Degree . . . . j
Closeness i
Betweenness . . . . h
Eigenvector . . . . d

INSNA

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