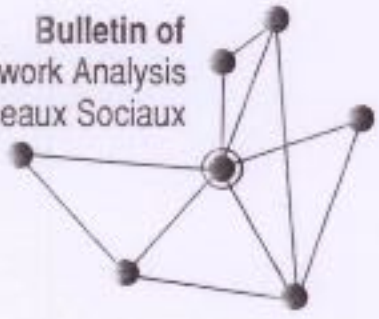
CONNECTIONS

Volume XV Numbers 1, 2 Summer, 1992

Bulletin of
The International Network for Social Network Analysis
Le Réseau International pour l'Analyse des Réseaux Sociaux



C O N N E C T I O N S

Volume XV **Numbers 1,2**

Summer, 1992

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CONNECTIONS

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MANUSCRIPTS and contributions of all kinds are encouraged, from members and colleagues: research papers of any length, reviews of applications of networks in different fields, comments and critiques, survey articles, computer programs, conference information, abstracts, teaching aids, etc.

FOR ANY SUBMISSION that is larger than four (4) double-spaced pages, please send a floppy disk (5 1/4" or 3 1/2") containing either a Wordstar, WordPerfect, or ASCII file along with hard copy.

FROM THE EDITOR

Once again, I have to apologize for the tardiness of this issue of CONNECTIONS, but it is essentially a double issue, containing three articles and hundreds of abstracts. At least we are getting it out in time that readers can still submit papers for the 1993 International Sunbelt Social Network Conference and, speaking of that, INSNA members and other CONNECTIONS readers should also be submitting manuscripts to us for possible publication. Remember, we are now using a peer review system, so publishing in CONNECTIONS should be respected by your peers. Send us your manuscripts, and continue to send us abstracts of any of your products, books, chapters, journal articles, technical reports, papers, whatever is relevant to networks.

If Barrry Wellman's "Ties and Bonds" column, on which we depend to keep up on with events, is not right up-to-date this time, it is entirely the fault of this editor, for I urged him to submit it months ago before he went to Japan. Our plan for 1992 was to publish three issues, in February, June, and October. We will begin working on Volume 15, No. 3, just as soon as we get this combined issue of 15(1,2) out.

The directory of INSNA members had been published in the first issue of the year, in alternate years. In order to make the directory more current with the membership for a given year, I plan to make the directory a part of the third issue of the year, and only those members who are paid up for that year will appear in the directory. Instead of relying on the memories of members, I will send out a separate notice. In the meantime, however, anyone may use the membership form at the back of any issue to make any changes that you would like for the directory. More and more people are using electronic mail, so if you think I do not have your BITNET or INTERNET address, please send it along to me. Mine is, by the way, ALWOLFE @ CFRVM.CFR.USF.EDU, the first two nodes being sufficient for BITNET users.

Please use the last page, or copies of it, to recruit members for INSNA. The more members we have the easier it will be to get some help to maintain the organization, and perhaps even get onto a timely regular schedule.

Alvin W. Wolfe
Editor, CONNECTIONS, and
Coordinator, INSNA

TIES & BONDS

Barry Wellman,
University of Toronto

INFO FLOWS

Reward wanted: Transcript of the John Sonquist retirement "roast" at Santa Barbara, 6/91....Herman Turk retired from Soc, U Southern California....Liviana Calzavara now Asst Prof of Preventive Medicine, U Toronto....She's finishing up a long-term longitudinal study of AIDS people & their partners....Randy Coates, the previous P.I. on the study died of AIDS, Fall, 1991....Claire Wenger appointed Co-Director of Centre for Social Policy Research & Development, U Wales- Bangor....Bonnie Erickson is Acting Director, Ctr for Urb & Cmty Studies, U Toronto, 1-6/92....Lorna Marsden to be President of Wilfrid Laurier U (Ontario, Canada)....Dan Perlman (UBC) new ed. of J of Social Issues....Holly Lattin-Mann now at Beh Sci, Charleston Southern U, SC....Rebecca Adams & Rosemary Blieszner have received a grant from Am Assoc of Retired Persons to study older adult friendships & mental help....Susan Gonzalez Baker (Mexican-American Studies, U Arizona) has just given birth to Paul Teodoro Palmer....Karen Campbell tenured at Soc, Vanderbilt...Jeff Johnson (Inst of Coastal Resources, East Carolina U) spent last summer in (& studying the Antarctic), & will be returning for the next 2 summers...Anatol Rapoport (Toronto) Canadian Science for Peace Sty's "Man of the Decade"....Wallace Clement (Soc, Carleton) elected Fellow of Royal Sty of Canada....Margaret Ross gained Toronto Ph.D (Beh Sci) for "The Caregiving Career Following the Institutionalization of Husbands."

NICE CHOICE

Network/structural analysis can't lose in the upcoming Amer Soc Assoc presidential elections: It's Charles Tilly vs. Bill Gamson. Also running are Andrew Abbott & Harvey Molotch for Committee on Publications, Pamela Oliver for Committee on Nominations, and Beth Mintz for Committee on Committees. Meanwhile Louise Tilly, structural analyst and spouse of Charles T., is the new prexy of the American Historical Assoc. Meanwhile, structuralists may be attempting a coup at the Am Soc Assoc's Medical Soc section? Election candidates include Blair Wheaton (Sec-Treas), Jay Turner (Council) & Jeffrey Salloway (Nominations Ctte).

RUSS'S OTHER LIFE

It seems that in addition to doing & helping network analysis, Russ Bernard has been helping the preservation & development of unwritten languages. The New York Times focused on Russ in a lovely story, 31 Dec 91. It pointed out that about half of the world's 6K languages may be dying out. Russ has developed a plan to use microcomputers (& laser printers) to encourage people to read & write in their own native languages. Among other things, he's helped establish a native literacy centre in Oaxaca, Mexico. They are desktop publishing in 9 languages. Other work is happening in the Cameroons, Africa. "Without popular literacy, all but a few endangered languages will soon disappear," he says.

SUN, RAIN, BEER

This year's Sunbelt Social Network Conference was only half-honest. Held in San Diego, mid-February, it rained most of the time. The upside of this horrific event was that most people went to sessions instead of gabbing in the sunshine. As there was a record attendance of about 180, there were lots of listeners per paper.

The honest part was that the Sunbelt is now officially the International Sunbelt Social Network conference with the first word appended to impress deans & other givers of grants. More than any other previous conference,

we lived up to their name. Not only were the Canucks there, but folks from Britain, France, Germany, Netherlands and from across the Pacific: Australia & Taiwan. I'd guess at least 25.

Walter Bien, from the Deutsches Jugendinstitut, Munich, took the occasion to announce that the next European Social Network conference will be held in Munchen (that's Munich for you Americans), June 1993. As Munchen is the ancestral home of my BMWs, it would be nice if someone organized the first network rally.

CATCH UP ON THE NEWS FROM PARIS

Meanwhile, the organizers of the recent (6/91) Paris Network Conference have produced an electronic version of many of the papers presented there. (Authors were limited to the equivalent of 10 pages of text.) If you want the IBM-compatible disk containing these papers, it's free! Write: Prof. Alain Degenne, LASMAS, IRESCO, 59-61 rue Pouchet, 75849 Paris Cedex 17.

THE NETWORK NEEDS HELP – GIANT BIBLIOGRAPHY

For over a decade, (a) Wolfgang Sodeur and (b) myself and David Knoke have compiled cumulative network analysis bibliographies. I added Knoke's entries to mine several years ago, and the result has grown to a 500K+ Word Perfect file (over 150 printed pages.) Meanwhile, Sodeur had started even earlier, and was more assiduous about listing our ancestors. But his database isn't compatible with mine, and it's beyond our limited computing ability to make them fit together.

It's silly to have two half-bibliographies. If we had one good one, we could distribute them cheaply to INSNA members. So this is a plea for someone with good programming skills to convert the two – and preferably to a widely- used (or easily- convertible) standard. I have Sodeur's disks, so you can contact me for everything: Barry Wellman, Centre for Urban & Community Studies, Univ of Toronto, Toronto Canada M5S 1A1; tel: 416-978-3930; fax: 416-978-7162; e-mail: wellman@epas.utoronto.ca. If you need to contact Sodeur for technical details, he's at Fach Empirische Sozialforschung, Universitiat Gesamthochschule Essen, Postfach 103764, 4300 Essen 1, Germany; tel: (0201) 183-3629.

RELIGIOUS NETWORKS

I. "(Jesus) was not so much concerned about the salvation of the souls of men as he was about the salvation of their social relations." A.E. Smith, Canadian Methodist minister & social gospelist, c1915, quoted in Ramsay Cook, The Regenerators, University of Toronto Press, 1985.

II. "A Letter to God" is the headline of an ad in the Broward County (Fla) Jewish Journal (1/92). The text: "A long holy tradition of placing a note between the breaks of the western (aka wailing) wall is a must for any jew who visits (Jerusalem). For those less fortunate who can't visit Jerusalem, ... Wishes by fax is a new advanced concept which combines state of the art technology & a religious belief. Your hand written note will be placed between the breaks of the western wall & Rabbi will also make a short prayer on your behalf. The service includes a photo taken in front of the western wall, with your note on it, to insure the customer that the service was rendered & to serve as a souvenir. The intended fee for the basic service will be $25. Within only several hours your note will be placed between the breaks of the western world, & the rest is up to god." (With the right fax number or e-mail address, you might even be able to skip the middle man.)

III. Jerusalem - Community Liberated or Saved? "Jerusalem, as my friend the philosopher once put it, is at the same time, the most international & the least cosmopolitan city in the world. People from many different nations have always lived in Jerusalem, & in this sense it has an international flavor; but to be cosmopolitan requires that a stranger's presence should not only be tolerable but natural & welcome. In this sense, Jerusalem is not cosmopolitan in the least but is sectarian in the extreme – & with a large number of sects. These sects live side by side, not together. They are each shut up in their own quarters & courtyards, sometimes behind walls & locked gates." Avishai Margalit, "The Myth of Jerusalem," New York Review of Books, 19 Dec 91, p. 63. (Perhaps they could send each other faxes via the western wall?)

ANNALS OF THE NEW WORLD ORDER'S NETWORKS

I. Another Excuse for George to Declare War & Win Re- Election: The Iraqi army allegedly trashed 150 new BMWs at the main Kuwaiti showroom & took away all the spare parts.

II. Historical Perspective: "We have no permanent friends nor perpetual enemies; our interests are permanent." Lord Palmerston, 19th British prime minister, as quoted by Peter Newman, Company of Adventurers, Penguin, 1985. (Guess it wasn't serendipity that I live on Palmerston Ave in Toronto.)

III. What to Do Until the Next Ideology Comes Along: "Given the collapse of palpable inadequacies of the reigning ideologies, what are we to do. First, try to utilize the insights the social sciences can provide. Second, recognize the limitations of both the state & of private, profit-seeking structures and, if possible, try to avoid reliance on any megalithic organization. A promising approach is found in the rich, intimate network of small clusters of like-minded individuals & tackling challenges on familiar ground without the stifling involvement of large- scale bureaucracy. Third, seek a balance between satisfying immediate individual or group interest & meeting the needs of society as a whole. (Political scientist John Meisel, Queen's U, Canada, in Toronto Globe & Mail, 21 June 90.)

IV. Meanwhile, American activist Ralph Nader urges us to substitute "civic living" – communal, empowering – for "corporate living" – megastructures manipulating atomized individuals (12 March 91, Toronto). Tocqueville said it first, but it always bears repeating.

V. Can Friendship Transcend Political Correctness? "In our times it has been easy to betray friends in the name of what are called convictions. And to do so with moral righteousness. A degree of wisdom is indeed required in order to understand that the positions we adopt are but imperfect & probably temporary hypotheses which can be made to seem like truths & certainties only by the blinkered. Unlike pretentious fidelity to convictions, fidelity to a friend is a virtue, perhaps the only virtue, perhaps the only one left." Czech author Milan Kundera, "The Umbrella, the Night World, & the Lonely World." New York Review of Books, 19 Dec 91, p. 47. (If you haven't seen his The Unbearable Lightness of Being, rent it immediately at your video store. A fine book, but a super-fine movie – & a key to understanding the complexities of eastern Europe.)

STAN HAS COME BACK TO HAUNT US

It's been more than 20 years since Stanley Milgram told us that all the world is connected by paths of 5 or less. I write this on March 6, 1992 – the day when the Michelangelo virus supposedly will wipe files from the face of PCs (or is it only first-born PCs?) As I wait fearfully for my words to dissolve in front of my eyes, I conjure Wellman's Codicil to Milgram's Conjecture: All PCs are less than 5 disk exchanges away from a deadly virus. I've been "STONED" already this year – how about you?

DRAWING NETWORKS

Most of us take for granted that network graphs are great for showing our intro students but serious work must be done with matrices. But many high-end microcomputer drawing programs now support "layers". For example, Micrographix Designer now supports 64 layers. This could allow block modellers and personal network analysts to keep track of up to 64 different role relationships among the same population. It might allow world systems types to have separate graphs for continents (or type of dominance) and combine them at will in multi-layered representations. Does anyone have experience with this? **YOU ARE NOT ALONE!**

Nobel laureate Murray Gell-Mann (Cal Tech), the physicist discoverer/inventor of the quark, has calculated how over-extended he is: "I take on about 50 times more than anyone can do, & I work at about 2% efficiency. So every day I'm fighting a factor of 2,500, & everyday I fall 8 years more behind. 98% of my time is wasted, just wasted." Gell-Mann has worked with US prexy Bush. "He's a nice fellow who gives very good parties. I just wish someone would find him a better job than running the country." (Scientific American, March 1992).

HANG UP THE PHONE TOM DOOLEY

Has anyone tried (a) putting call-forwarding on your home telephone so that calls get forwarded to your office phone, and (b) simultaneously putting call-forwarding on your office phone so that your calls get forwarded to your home phone? This should result in an endless loop of unconsummated reciprocity. It adds network meaning to the old New York saying, "Go Phone Yourself!" Bill Richards & I tried a variation one late night in Vancouver when the data just wouldn't behave & we were giddy. We logged on to his Vancouver account, used TELNET to log on to my Toronto account and then used TELNET to log on to his Vancouver account through my Toronto account. Going transcontinentally three times, we succeeded in running very slow e-mail.

E-MAIL CAN BE DANGEROUS!

Bev & I were spending a romantic Saturday night running SAS (you can read the results in the 8/91 Journal of Social and Personal Relationships in case you missed it at the Sunbelt) when I got an obscene e-mail message from a stranger. It's easy to trace almost all e-mail messages to its source. Our systems administrator also was able to see if anyone else had received the message & to see who had logged on at the same time as the message was sent. The message had come from the account of an unknown male undergraduate who claimed to have walked away from his terminal without exiting. ("But I didn't know you have to type LOGOUT".)

GEORGE HOMANS – AN APPRECIATION IN HIS OWN "WRITE"

Barry Wellman

George Homans died in 1989. Many of us thought that he had been at Harvard forever. Despite his cantankerous focus on dyadic interaction, he had a strong impact in the 1960s on the band of Harvard grad students who grew up to be network analysts. Throughout his career, he strongly encouraged folks like Charles Tilly and Harriet Friedmann to apply sociological analysis to historical phenomena. What was Homans's impact on us grad students? He insisted we take evidence seriously – whether historical or interactional – and not get totally lost in abstract theoretical clouds. He urged common-sense, agnostic thinking, and straight-forward writing. Even his celebrated elitism – as a direct descendant of The (original) Adams Family – worked out well: As all were equally his social inferiors, he took graduate students seriously. I recently read Homans's intellectual autobiography, Coming to my Senses which concentrates on his naval and Harvard careers (Transaction Books, 1984). It is one of the wittiest books I have ever read, and Homans is still fun to argue with. Here are some provocative excerpts (with page numbers):

Nobody, except perhaps Lenin, could dominate Sorokin. (105) As the first chairman of Sociology, Sorokin, though possessing other great qualities, had acquired the continental European tradition – which had did not find uncongenial – that the head of a department had the right and duty to be an autocrat. As such I am sure he made life difficult for Talcott Parsons. (295) Talcott was always "building bridges" even if there were not always two abutments to build them between. (295)

My very first faculty meeting (of the new Dept of Social Relations) introduced me to the enormous capacity intelligent, but intellectual, men and women command for debating the trivial, for debating about words, not things....The founding fathers always stressed later the shared intellectual interests that brought them together: these were first a fascination with what were then considered the "softer" sides of the social sciences, especially the relations between personality, culture, and society, and second, the need to develop a theory that would link all three. But there was a second force that brought the founding fathers together, a force that cannot be wholly separated from the first. That was dissatisfaction with their personal situations in their own departments. (294) Socially, I always got along well with them, except for occasions like Christmas parties, when I felt juniors might be allowed some license in what they said about seniors.... "Remember," I would tell the graduate students, "Gordon Allport is not your mother." (296).

The Social Relations Department would have fallen apart sooner or later, but the actual event had to have a precipitating cause. That turned out to be the student rebellions, which...reached Harvard in the years 1969 and 1970.... It came to the point at which I could not bear to listen in department meetings to the bleatings and wafflings of the foolish, hypocritical, and self-righteous "liberals".... One of the purest pleasures I have enjoyed from no longer being a member of the Department of Social Relations is my freedom from ever having to pay the slightest serious attention to such people again. If they will stick to their business, they are often good fellows, but as academic statesmen they make me puke. (306) The Department...put me in touch with many good and interesting men and women – as well as with some consummate asses. Some of them were both interesting and asinine at the same time. (307)

Let me not give the impression that I was the chief mover in the breakup of the old department. That was my colleague in sociology, Harrison White, who put forward the theory that sociology would be able to wangle more new appointments out of the dean of the faculty if it were an independent department rather than a mere "wing" of Social Relations. He turned out to be quite mistaken, since his proposal came just at the time when Harvard...began to run a large deficit. (307).

ANNOUNCEMENTS

Sunbelt XIII Social Network Conference

Call for Papers

The 13th Annual International Sunbelt Social Network Conference is scheduled for February 11-14, 1993 at the Holiday Inn near Busch Gardens in Tampa, Florida. The ISSNC provides an opportunity for those interested in social network theory, methods, or applications to come together and share their ideas. The conference is sponsored by the International Network for Social Network Analysis (INSNA), and by the Departments of Anthropology at the University of Florida and the University of South Florida.

Following is the list of sessions that have been proposed for the 13th ISSNC. If you wish to present a paper on any of the following topics, please write directly to the session organizers. If you wish to submit a paper in any other area; or if you are not sure whether your paper fits in any of the proposed session; or if you wish to propose a session; correspond with either of the conference organizers (PLEASE USE ELECTRONIC MAIL IF POSSIBLE):

- H. RUSSELL BERNARD
  ANTHROPOLOGY
  1350 TURLINGTON HALL
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  FROM INTERNET: ALWOLFE@CFRVM.CRF.USF.EDU.

All papers proposed for presentation should be accompanied by an abstract of no more than 150 words, in ASCII or in WordPerfect format, on disk. Abstracts will be published and distributed at the conference. Deadline for submitting papers is November 1, 1992. Participants may give one single-authored paper, or two papers on which they appear as coauthors.

Program Sessions (So Far)

1. Organizational Networks (two sessions): David Krackhardt, Urban & Pub. Affairs, Carnegie-Mellon University, Pittsburgh, PA 15213, or Joseph Galaskiewicz, Sociology, University of Minnesota, Minneapolis, MN 55104
2. Community Networks: Barry Wellman, Sociology, U. of Toronto, Toronto, ON M5S 1A1 CANADA
3. Competition: Ronald Burt, Sociology, Columbia University, New York, NY 10027
4. Networks and Social Support: Terrance Albrecht, Communications, Univ. of South Florida, Tampa, FL 33620
5. Networks and Stratification: Jeanne Hurlbert, Sociology, 126 Stubbs Hall, Louisiana State University, Baton Rouge, LA 70803
6. Communications Networks: James A. Danowski, Communication, University of Illinois, Chicago, Illinois 60680

7. Migration Networks: Ivan Light, Sociology, 405 Hilgard Ave., University of California, Los Angeles, CA 90024
8. Life Cycle Networks: J. Jill Suitor, Sociology, Louisiana State University, Baton Rouge, LA 70803
9. Networks and Collective Action: David B. Tindall, Sociology, U. of Toronto, Toronto, ON M5S 1A1 CANADA
10. Discrete Methods in Social Network Analysis: Alain Degenne, LASMAS, 56-61 Rue Pouchet, 75849 Paris, FRANCE
11. Networks and Social Structure: Households and Kinship: Thomas Schweizer, Ethnology, Alb-Magnus-Platz, University of Cologne, W-5000 Koln 41, GERMANY
12. Networks and Technology: Thomas Schott, Dept. of Sociology, Univ. of Pittsburgh, Pittsburgh, PA 15260

Workshops

1) Introduction to Social Network Analysis. 3 hours. Presenter: Barry Wellman. Cost: $30. Presenter: Barry Wellman, Sociology, Univ. of Toronto, Toronto, ON M5S 1A1 CANADA. E-MAIL: WELLMAN@EPAS.UTORONTO.CA

   This non-technical introduction by the founder of INSNA sets 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 modelling, clustering, and ego-centric 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).

2) Using UCINET IV to Analyze Social Network Data. 4 hours. Presenters: Stephen Borgatti and Martin Everett. Cost $50. Contact: Stephen Borgatti, Sociology, Univ. of South Carolina, Columbia, SC 29208. E-MAIL: N040016@UNIVSCVM

   This workshop enables participants to use the UCINET IV network analysis program to analyze network data. Key topics are: entering, importing and editing data; matrix manipulation and data management; analyzing connectivity, transitivity, density; centrality; detecting cohesive subgroups; identifying positions and roles; matrix correlation and regression. There are 2 hours of lecture, discussion and demon- stration at noon, followed by 2 hours of hands-on experience in the evening. Only 20 participants will be accepted.

Hotel Reservations

CALL 1-800-HOLIDAY OR 813-971-4710. BE SURE TO MENTION "SUNBELT" OR "INTERNATIONAL SUNBELT" CONFERENCE TO GET THE SPECIAL RATE OF $59.00 PER NIGHT, SINGLE OR DOUBLE. TRAVEL AGENTS: USE APPOLLO/SABRE 2514, OR PARS/DATAII 1377, OR SYSTEMONE 561, OR FAX: 813-977-0155.

The Holiday Inn conference facility is near Busch Gardens and the University of South Florida. It is convenient to I-75 and I-275, with easy access to downtown Tampa, historic Ybor City, and the beaches. There is direct limo service available from Tampa Int'l Airport.

Keynote Speaker

The keynote speaker for the 1993 conference will be A. Kimball Romney. His address to the conference begins on Thursday, Feb. 11th, at 5:30 p.m., followed by a cash bar and a banquet. We'll notify you about subscribing to the banquet in the next mailing.

Registration

$48 in advance for members of INSNA; $60 for those who are not members of INSNA and those who choose to register at the conference. Conference registration for students is $22. In absentia registration is $15 (this entitles the registrant who can not attend the conference to list a paper in the abstracts and to receive a copy of the abstracts.) Membership in INSNA (which includes the CONNECTIONS newsletter) costs $30 per year. (Member-

ship application forms are printed in every issue of CONNECTIONS.) Make advanced registration checks out to "ECS" and mail to H. Russell Bernard at the address above.

Student Paper Prize

A prize will be offered for the best student paper submitted for presentation to the 1993 Sunbelt Social Network Conference. The prize, worth $1000, is administered by Phillip Bonacich. Students are encouraged to submit their work for consideration by Nov. 1, 1992. Write to Bonacich at: Dept. of Sociology, Univ. of Calif., Los Angeles, CA 90024. Tel:310-825-3017; fax:310-391-0738.

WARNING!
ERROR IN CURRENT ISSUE OF SOCIAL NETWORKS

The current issue of *Social Networks* (volume XV, numbers 1,2, March/June 1992) is a special issue on block-modeling guest-edited by Steve Borgatti. It also contains an unusual error. The title of a paper by Borgatti and Everett, "Regular Blockmodels of Multiway, Multimode Matrices", was mistakenly switched with the title of another paper (by Everett and Borgatti) entitled "Regular Colorings of Digraphs, Networks and Hypergraphs." The order of authors was switched as well. Two of the other papers in the same issue make reference to the "Regular Blockmodels..." paper. These references were also changed to the incorrect title and authorship.

Confused?

The *correct* title and authorship should have been:

"Regular Blockmodels of Multiway, Multimode Matrices." by Borgatti and Everett

What actually came out was....something different. You'll see it when you get it.

To deal with the problem, the publisher will be mailing a replacement for the first page of the unlucky paper to each subscriber. The replacement page, which has an adhesive backing, is supposed to be stuck on top of the mistaken original. Hopefully, libraries and others will manage to do this correctly. No provision has been made to replace the back cover of the journal, which contains the table of contents. Authors are asked to please cite the paper as it should have been ("Regular Blockmodels of Multiway, Multimode Matrices" by Borgatti and Everett), rather than as it actually came out ("Jibber-Jabber About Technical Things" by Elbereth and Borsnotty).

UCINET IV: Network Analysis Software

Stephen P. Borgatti
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Martin G. Everett
University of Greenwich
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Linton C. Freeman
University of California, Irvine

UCINET IV is a general purpose computer program for network analysis. It replaces UCINET 3.0 (MacEvoy and Freeman) and NETPAC (Borgatti), both of which are now unavailable. Like its predecessors, UCINET IV implements a diverse collection of network analysis techniques, in addition to traditional statistical procedures and data management facilities.

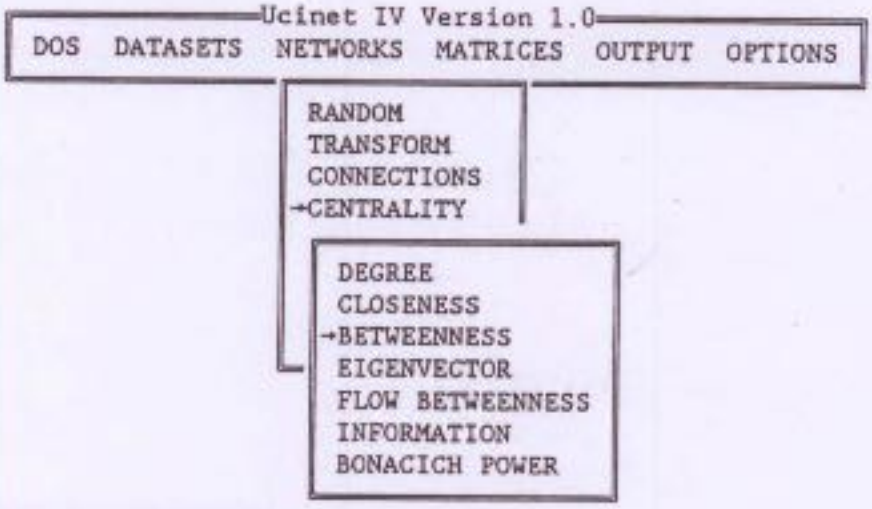

Figure 1. *Snapshot of UCINET IV menu.*

1.User Interface

UCINET IV is, for the most part, *menu-driven*. This means that instead of having to remember the spelling and syntax of hundreds of commands, you only have to choose an analysis from a menu. An exception is the matrix algebra package, which is command-driven. A snapshot of the menu system is shown in Figure 1.

The program is also *forms-driven*. This means that instead of having to choose options and parameter values by placing numbers in certain columns of a command file, you respond to fill-in-the-blank questions that appear on-screen. An example of a form — one that pops up when you choose to run the CLIQUE procedure — is shown in Figure 2.

```
Input dataset:                  ▒▒▒▒▒▒▒▒▒▒▒▒▒▒
Minimum size:                   3
Analyze pattern of overlaps?:   YES
Output clique indicator matrix: CLQSETS
Output co-membership matrix:    CLQOVER
Output partition indicator matrix: CLQPART
                                        Press F10 when done
```

Figure 2. *Example of a UCINET IV form.*

The first line asks for the name of the UCINET IV dataset containing the data. For instance, if the dataset is called *samples*, and it is stored on the floppy disk in drive A:, you would type "a:sampes" to fill in the blank. The other lines already have default answers filled in. You can either accept them, or change them by moving the cursor to the spot and typing a new value over the old. In some cases, you can press a key (ctrl-enter) to bring up a list of choices. Additional information about each parameter is provided by a help line that appears at the bottom of the screen (not shown here).

Running a UCINET procedure results in both screen output and file output. The screen output from the CLIQUE procedure is shown in Figure 3. As you can see, the output gives the name of the input data file, as well as the values of all parameters. This makes it easy to reproduce results at a later time. Next are a list of cliques and their members, a node-by-node clique co-membership matrix, and a single-link hierarchical clustering of the co-membership matrix. The screen output is scrollable, which means you can use the cursor keys to re-examine any part of the output, no matter how long or wide it might be. The output can also be saved, printed, or appended to an ASCII file (presumably for inclusion in a word processing document).

The file output from the CLIQUE procedure consists of three UCINET datasets that can be used as input to other procedures. One contains a clique-by-node binary matrix which indicates which nodes belong to which cliques. Another contains the co-membership frequency matrix. The third contains the partition information resulting from a hierarchical clustering of the frequency matrix. Any of these can be input to other procedures for further processing. For example, the co-membership matrix could be submitted to multidimensional scaling, or to a different kind of clustering.

2.Network Analysis Techniques

The network-theoretic capabilities of the program can be divided into six basic areas: transformations, connectivity, centrality, subgroups, positions, and hypothesis testing. This division corresponds to the UCINET IV menu structure.

Network Transformations. Most of the routines classified as network transformations are concerned with graph-theoretic concepts such as linegraphs, multiplex graphs, multigraphs, image graphs, density tables, subgraphs, permutations, and so forth. Others concern the creation of graphs from other kinds of data, such as person-by-attribute matrices. Still others concern the derivation of other mathematical objects from graphs, such as semigroups and hypergraphs.

Connectivity. While almost all of network analysis can be viewed as studying connectivity, what we mean here is the calculation of such things as distance between nodes, reachability, maximum flows, volume of paths and walks, and other measures of proximity or cohesion. In many cases, the program is able to compute these measures not only for binary adjacency data, but also for various kinds of valued data, including costs, strengths, and probabilities. Also included here are global measures of transitivity and density.

Centrality. Centrality is an attribute of nodes that reflects how important the node is to the structure of the network. A number of standard measures of centrality can be computed, including Freeman's degree, closeness and betweenness measures, Bonacich's eigenvector and power measures, and several others. Some of the measures can be computed on both directed and undirected data.

Subgroups. Dozens of definitions, algorithms, and criteria have been proposed for identifying cohesive subgroups within social networks. UCINET IV computes cliques, n-cliques, n-clans, lambda sets, factions, and k-plexes. In addition, the program computes "regions" which contain cohesive subgroups, such as k-cores, components, and graph-theoretic blocks.

```
CLIQUES

Minimum Set Size:   3
Input dataset:      C:\UCI3\SAMPES

WARNING: Valued graph. All values > 0 treated as 1
WARNING: Directed graph. Direction of arcs ignored.

14 cliques found.

   1:  8 9 10 11
   2:  9 10 11 12
   3:  2 7 9 10
   4:  10 12 13 14
   5:  8 10 13 14
   6:  10 17 18
   7:  2 3 5 6
   8:  2 3 5 7
   9:  2 3 7 9
  10:  4 5 6
  11:  4 5 7
  12:  2 6 15
  13:  15 16 17
  14:  16 17 18

HIERARCHICAL CLUSTERING

                          1 1 1 1 1 1 1 1
Level   1 4 5 6 3 2 7 8 9 0 1 2 3 4 5 6 7 8
-----   - - - - - - - - - - - - - - - - - -
    3   . . . . XXXXX . XXX . . . . . . . .
    2   . XXXXXXXXXXXXXXXXXXXXXXXXXXXX . XXXXX
    1   . XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
    0   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Group indicator matrix saved as dataset CLQSETS
Clique co-membership matrix saved as dataset CLQOVER
Clique co-membership partition-by-actor indicator matrix saved as dataset CLQPART

Elapsed time:  1 second. 12/10/1991 11:07 AM.
UCINET IV 0.41 Copyright 1991 by Analytic Technologies.
```

Co-Membership Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	5	3	0	2	2	3	0	2	1	0	0	0	0	1	0	0	0
3	0	3	3	0	2	1	2	0	1	0	0	0	0	0	0	0	0	0
4	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
5	0	2	2	2	4	2	2	0	0	0	0	0	0	0	0	0	0	0
6	0	2	1	1	2	3	0	0	0	0	0	0	0	0	1	0	0	0
7	0	3	2	1	2	0	4	0	2	1	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	2	1	2	1	0	1	1	0	0	0	0
9	0	2	1	0	0	0	2	1	4	3	2	1	0	0	0	0	0	0
10	0	1	0	0	0	0	1	2	3	6	2	2	2	2	0	0	1	1
11	0	0	0	0	0	0	0	1	2	2	2	1	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	1	2	1	2	1	1	0	0	0	0
13	0	0	0	0	0	0	0	1	0	2	0	1	2	2	0	0	0	0
14	0	0	0	0	0	0	0	1	0	2	0	1	2	2	0	0	0	0
15	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	1	1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	1
17	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	3	2
18	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	2	2

Figure 3. *Output from the CLIQUE procedure.*

Positions and Roles. UCINET IV implements algorithms for computing three positional concepts: structural equivalence, regular equivalence, and automorphic equivalence. Options available for structural equivalence are CONCOR, CATIJ, profile similarity, and tabu search blockmodeling. For regular equivalence, UCINET implements the REGE and CATREGE algorithms, plus a tabu search method. For automorphic equivalence, UCINET implements three algorithms, including a tabu search approach.

Hypothesis Testing. Suppose you believe that people who have similar values are more friendly with each other than people with different values. If you have measured both friendship and similarity-in-values (e.g. correlations across attitude variables), you can test the hypothesis using the QAP procedure, which essentially correlates one matrix with the other. There is also an analog to multiple regression called MRQAP. This can be used to predict ties in one social relation, given information on other relations.

3.Statistics and Multivariate Analysis

This category is a hodge-podge of numerical procedures which are not peculiar to network analysis, but are often used in this context.

For describing the rows, columns, or all values in a data matrix, UCINET provides a variety of univariate statistics, such as means, standard deviations, sums, norms, etc. For scaling rows and columns, UCINET performs correspondence analysis and singular value decomposition (which can be used for factor analysis and MDPREF). And for modeling variables, UCINET includes a standard OLS multiple regression procedure.

UCINET also includes a number of procedures for creating and analyzing proximity matrices, such as correlations, euclidean distances, perceived similarities, etc. For creating proximity matrices from rectangular data, UCINET computes a variety of measures of similarity and distance. For analyzing proximity matrices, UCINET provides metric and non-metric multidimensional scaling, and various forms of cluster analysis.

4. Data Manipulation and Transformation

One of the strongest features of UCINET is the ability to transform, edit, normalize and otherwise massage data matrices. As any data analyst knows, this is where the most "analysis" time is usually spent. UCINET has routines for symmetrizing, dichotomizing, recoding, reversing, transposing, standardizing, reshaping, sorting, permuting, collapsing and subsetting matrices.

A spreadsheet-like editor allows you to enter or change individual matrix values.

UCINET also contains a command-driven matrix algebra language with functions for element-wise arithmetic (add, subtract, multiply, divide), matrix multiplication, element transformations (e.g., log, absolute value, sine), determinants, inverses and generalized inverses. Also included are functions for performing within-matrix arithmetic, such as taking sums, averages, minimums and maximums of matrix values, either across all values in the matrix, or separately for each row or column.

5. Dataset Management

UCINET datasets consist of a pair of physical files (a data file and a header file) which, within the UCINET environment, are treated as a single object. In order to minimize human error in copying, renaming or other housekeeping of datasets, the program provides a series of functions to replace ordinary DOS commands (e.g., rename, copy, delete, dir) which operate simultaneously on both physical files. Also provided are routines for displaying the contents of datasets, for merging datasets, and for editing datasets.

Import and export routines allow you to read and write ASCII files in order to exchange data with other programs, such as SYSTAT, NEGOPY, and STRUCTURE. A full-screen editor based on the WordStar command set is provided for editing ASCII files. A browser is provided for examining very large ASCII files.

Other miscellaneous file-related facilities including changing the default directory, printing files, and changing printer settings (e.g., switching to compressed font).

6.Purchasing the Program

UCINET IV is distributed by Analytic Technologies, which also publishes ANTHROPAC and the *World Cultures* electronic journal. Two versions of the UCINET IV are available: a professional and a student edition. The professional edition is currently priced at $75 plus shipping ($5 for the Americas, $10 for Europe, and $14 otherwise). The student edition is $29, plus shipping. The student edition comes in a shrink-wrapped package which can be ordered through a university bookstore, like a textbook. In addition, there are extremely inexpensive instructional and site licenses available. All quoted prices are guaranteed until the end of 1992. Personal checks, credit cards (Visa and MasterCard only), and university purchase orders are accepted.

For more information, contact Analytic Technologies, 306 South Walker St., Columbia, SC 29205 USA, Telephone (803) 771-7643.

MEETINGS

- **Aug 20-24, 1992. American Sociological Association Annual Meeting.**
  Pittsburgh, PA. Theme: Sociology and the Reconstruction of Society. Contact ASA, 1722 N Street NW, Washington, DC 20036.
- **Aug 24-28, 1992. 13th International Congress on Cybernetics.**
  Namur, Belgium. Contact International Association for Cybernetics, Palais des Expositions, Place Andre Rijckmans, b-500 Namur, Belgium, Tel. 00-32-81-73.52.09.
- **Sep 2-4, 1992. International Population Conference: Revival of Ageing Societies.**
  Espoo, Finland. Contact Ms. Hilkka Vuorenmaa, Vaestoliitto, Kalevankatu 16, 00100 Helsinki, Finland.
- **Sep 17-18, 1992. South Asian Anthropologists' Conference.**
  London, England. Contact Jonathan Spencer, Dept of Social Anthropology, Univ of Edinburgh, George Square, Edinburgh EH8 9LL UK.
- **Oct 1-3, 1992. Assocaition of Third World Studies.**
  Gainesville, Florida. Contact Paul Magnarella, Anthropology, Univ of Florida, Gainesville, FL 32611.
- **Oct 15-17, 1992. European Studies Conference.**
  Omaha, Nebraska. Contact Bernard Kolasa, Political Science, Univ of Nebraska, Omaha, NE 68182.
- **Oct 16-17, 1992. California Sociological Association Annual Meeting.**
  San Diego, CA. Theme: The Cutting Edge: Technology and Sociology in California. Contact: James A. Glynn, President-elect, Behavioral Science Division, Bakersfield College, Bakersfield, CA 93305.
- **Oct 21-24, 1992. Transcultural Nursing Society Annual Conference.**
  Miami, Florida. Contact Olivia Still, P.O.Box 473, Indian Health Services Hospital, Zuni, NM 87327.
- **Oct 28-31, 1992. International Congress of Arctic Social Sciences.**
  Quebec City, Canada. Contact: Ludger Muller-Wille, Geography, McGill University, 805 Sherbrooke W., Montreal, Canada H3A 2K6.
- **Nov 5-8, 1992. Social Science History Association Annual Meeting.**
  Chicago, Illinois. Contact Margo Anderson, History, Univ of Wisconsin, Milwaukee, WI 53201.
- **Nov 20-23, 1992. Association for Canadian Studies in the U.S. Anniversary Conference.**
  Boston, Massachusetts. Contact ACSUS, Ste 620 One Dupont Circle, Washington DC 20036.
- **Dec 2-6, 1992. American Anthropological Association Annual Meeting.**
  San Francisco Hilton, San Francisco, CA. Contact American Anthropological Association, 1703 New Hampshire Avenue NW, Washington, DC 20009.
- **Feb 11-14, 1993. International Sunbelt Social Network Conference.**
  Holiday Inn near Busch Gardens, Tampa, Florida. See full announcement elsewhere in this issue. Cosponsored by the International Network for Social Network Analysis, the University of Florida, and the University of South Florida. Paper submission to H. Russell Bernard, Anthropology, University of Florida, Gainesville, FL 32611. EMAIL: UFRUSS@NERVM.BITNET or UFRUSS@NERVM.NERDC.UFL.EDU.
- **Mar 10-14, 1993. Society for Applied Anthropology Annual Meeting.**
  San Antonio, Texas. Contact Program Chairs Maria Luisa Urdaneta, Univeristy of Texas San Antonio (512 696-7509), or John Donahue, Trinity University (512 736-8508), or SfAA Business Office, P.O. Box 24083, Oklahoma City, OK 73124.
- **Mar 10-14, 1993. Conference on Culture, Society & Change in the Americas.**
  Merida, Venezuela. Cosponsored by Universidad de los Andes and the University of South Florida. Contact Leslie Oja, Division of Conferences and Institutes, University of South Florida, Tampa, FL 33620.

- **Mar 24-27, 1993. Southern Anthropological Society Annual Meeting. Savannah, Georgia. Contact Daryl White, Spelman College Box 247, Atlanta, GA 30314.**
- **Apr 23-24, 1993. Society for Economic Anthropology Annual Meeting. Durham, New Hampshire. Contact Gracia Clark, Dept of Anthropology, Univ of Michigan, Ann Arbor, MI 48109.**
- **Jun 10-13, 1993. Third European Conference on Social Network Analysis. Munich, Germany. Cosponsored by International Network for Social Network Analysis and the Deutches Jugendinstitut. Contact Secretariat der 3. Europaischen Konferenz zur Analyse Socialer Netzwerke, Deutches Jugendinstitut E.V., Freibradstrasse 30, D-8000 Munchen 90, GERMANY.**
- **Jul 29-Aug 5, 1993. International Union of Anthropological and Ethnological Sciences Congress. Contact Linda Manzanilla, Instituto de Investigaciones Antropologicas, UNAM - Ciudad Universitaria, Circuito Exterior, 04510 Mexico DF MEXICO. (5)5-48-78-28.**

Some Thoughts on Conferences

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The worst conference I've attended recently was in Lyon, France. Although the subject was "communications," almost all of the speakers: – (a) spoke with their hands over their mouth, – (b) sat with collapsed chests and diaphragms when they spoke to an audience of 200 instead of standing & projecting, – (c) didn't use transparencies or slides as visual stimuli. Fortunately, I had a good book handy (rule #1 for conference attendance).

I suppose all of us let our minds wander at conferences and daydream about how to run them better. I've recently used these times to scratch out some ideas that organizers and presenters might be able to use in the future:

1. Demand Papers in Advance. Or at least an extended (5 page) outline. It improves the odds that the speaker won't insult and bore the audience by being totally unprepared. I'm tired of folks throwing disorganized bull at me when I' ve made an effort to hear them. The most horrible example was a Sunbelt keynote speaker a few years ago who rambled on for 45 minutes and disappeared the next day without attending a session.

Many INSNA-niks might object that demanding papers in advance would detract from our casualness and spontaneity. Yes, sometimes. But if you can't bat out a five-page outline of what you are going to say, it ain't worth asking people to give up their time, energy and money to listen to you. By contrast, the computer scientists I now work with must submit their papers to a program committee in advance. Their quality is as good as ours – so is their spontaneity with plenty of informal chat about most recent work. If we want to continue accepting all comers at the Sunbelt, at the very least we should clearly label in the program the talks for which no advance papers or outlines were submitted.

2. Exchange Papers in Advance among Presenters. If paper-givers knew what each other were going to say, they would refer to each other more – in support or in argument. Nan Lin did this at the last Sunbelt to great effect. The result was so coherent there is talk of turning it into a special journal issue. It takes a little work, but the payoff is worth it. Right now, papers that should be in dialogue go right past each other on parallel, non-intersecting, tracks.

3. Insist that Presenters have Something to Say. One horrible example was the doctoral student at the Paris conference who spoke vaguely about the research he might like to do someday if he ever got around to writing a thesis proposal. I got so mad at the latter's presumption on his audience that as session chairman I told him we'd be happy to entertain questions at a future conference when he had accomplished something. Another disaster happened two years ago at the Sunbelt when someone presented a conceptual scheme with 45 variables and 86 arrows connecting them. "Which ones should I study first?" he concluded.

I come to conferences to find out what others have found out, the techniques they used, and the theoretical ideas that were associated with their research. Unless it's a innovative study like Laumann-Coleman-Gagnon's abortive sex in America survey or a mega-project like the 1985 (US) GSS, people don't want to listen to a paper about a study that will be done in the future. I know that grad students think their theses are going to be really important – it's a necessary sustaining myth to get through the tortures of the doctoral program. They can – and should – use informal chats at the conference to get feedback but not put us to sleep with soporific conceptual schemes.

4. Talk, Don't Read. Presenting a paper is an oral/aural medium; reading a written-out paper word-for-word ignores the usefulness of talking. When someone reads a paper, then invariably fall it into a boring, sing-song rhythm. I can feel my brain-waves falling into a trance where nothing penetrates. Only Richard Burton or Dylan Thomas could make reading out loud interesting (although even they would be stymied by "Block Models I"). If you are going to read a paper, then I prefer that you just hand me a copy. I can read it more quickly and comfortably by myself – preferably basking poolside in the Sunbelt sunshine.

A paper must be presented actively, using verbal cues, varied rhythms and selectivity to emphasize the highlights of the story line. I can't remember the details anyway; they will be waiting for me in the written text. When you're giving a paper, you're doing jazz! Improvise; don't read the score.

5. Stand and Deliver. A good indicator that a talk will be boring is when the speaker remains sitting down. To some extent, this is psychological – I always assume that when healthy people sit and talk, they don't think they have anything interesting to say. Sitting and speaking also encourages mumbling downwards into your notes instead of projecting out to your audience. So why should I listen?

When you stand, you project. You talk from the diaphragm, and you talk more forcefully and more interestingly. You use body language and help engage the audience's visual attention. And use a podium (or in a pinch, your briefcase or coat) to lift your head up towards the audience. You may even find that you like your own talks better.

6. Papers should be Seen as well as Heard. Everyone should use transparencies (or slides or handouts) even if it is to give an outline of the paper. For one thing, visual messages actively engage multiple senses of the body for cognition. Otherwise listeners will default to passive auditory withdrawal. For another thing, some people receive information aurally and some visually. When you use transparencies, you get them both. Furthermore, projecting an outline early in the talk gives the audience a sense of the architecture of your discourse. A paper isn't a mystery novel. An audience understands better if it knows where the speaker is going.

Data should be up there in lights. But don't just photocopy a large table – pick out the interesting stuff, ignore the detail, and throw it up in large readable type. (The experts say at least 15 point.) The most horrible transparency I ever saw was at this year's Sunbelt when someone projected a single spreadsheet of about 50 rows by 100 columns. His whole talk about Canadian corporate interlocks consisted of waving at unreadable lines on the screen. From 5 rows back, it looked like bar codes – an indecipherable mass of black and white splotches.

The more you engage the audience the better. You might try to project pictures – and not just of community studies. Why not show us General Motors' main boardroom when talking about corporate interlocks? EDS (a GM subsidiary, by the way), has developed computer animation for displaying changes in interaction during executive meetings – they use it in part to discover coalitions and cleavages. My wife Bev Wellman and I once involved an audience in a movement workshop in order for them to learn kinesthetically how body language can affect feelings of social support.

7. Pointers on Pointing. How do you get your audience to see what you see in the transparencies? Too many presenters turn their backs on the audience and commune with the screen, apparently transfixed by the beauty of what they have wrought. They may even wave their hands at the screen in a lame effort to show the audience what's up, yet all the audience sees is a large, dark outline of their suited arm.

Far better to face the audience and use the tip of a ball-point pen to point at the transparency itself. If you want a neat, inexpensive present, ask someone to buy you a stainless-steel telescoping pointer which does the same thing but allows you to stand further from the screen. When I did consulting with engineers, they all used such pointers for million-dollar presentations. Like Greek worry-beads, it also makes a nice pacifiers for nervous hands while you talk. If you're really rich, you can be like Luke Skywalker and buy a laser lightbeam pointer for a few hundred dollars. It's just the thing for pointing at a distance to large-screen slide shows. May the force be with you!

8. Have Longer Papers. This is the idea about which I am the most ambivalent. When a paper is boring we pray that the speaker will finish as soon as possible. But how many times have our own papers (which are always wonderful) or others' been butchered by compression to 10 or 20 minutes. The problem is especially compounded when inexperienced or lazy speakers spend 90% of their time on the introduction, so that all of their potentially more-interesting findings get squeezed incoherently into the last 5 minutes.

Most people talk to fast, trying to get everything in. My dream is to hear papers in which the speakers say thoughtful things in relaxed, interesting ways. Such breathing room often will include significant dialogue with the audience instead of speakers doggedly plowing through their points, hoping to beat the clock. I'd guess the general optimum would be between 25 and 40 minutes, including discussion. Let's limit to 10 minutes those presenters who haven't submitted a paper or outline in advance: Their thoughts will be so disorganized it would be painful to listen longer. And we ought to give special kudos to those speakers who say what they need to in a shorter time – and sit down.

9. Chairs should be Active Participants. Too often, session chairs seem like bored announcers listlessly intoning, "The next speaker is..." If a chair looks bored, an audience will pick up his/her cues. The chair should always be ready to ask the first questions – and fairly tough ones. This will reawaken the audience to continue the game. I've seen chairs at humanities conferences do this well. The result is informal discussion that is livelier and more informative than the paper itself.

One caution: Chose with care what you say and who you say it to. At the last Sunbelt, I waved a sign in front of a speaker: "Only five more minutes." The speaker – my wife – stared at me and said forcefully, "Are you kidding?" She spoke as long as she wanted.

10. Have Discussion During and After Every Paper. Next time you are at the end of a session, try to remember what the first speakers said. It can't be done. You're either too excited by the final speaker or have been put to sleep by his/her boring paper. Inevitably, when questions are held to the end of a session, almost all questions go to the last speaker. The rest of us just sit there, smile bravely, and feel pissed-off that the work we've spent so much time doing is being totally ignored.

More frequent alternation between paper-giving and question-asking will enliven the rhythm of the session and move it away from being a drone. The easy change is to have a short question period after every paper. It would be even better to have enough time during a paper for the speaker to deal with questions as they arise. Almost everybody is more interesting answering questions than giving apparently-seamless papers. However, this would involve tough-minded speakers and chairs who could shut off chronic questionners.

11. Get Audiences Off their Butts. Fitness experts agree that people shouldn't sit for more than an hour or so. The body hurts; attention lags. It's nice to give everyone a stretch in the middle. The time won't be wasted, because people will listen more alertly. If you can combine this with a coffee break, then you'll get more informal chat – the key to good conferences.

12. Keep Sessions Short. If sessions last only 1 1/2 hours, then there's more time to chat in the hallways. We'll have more tightly-focused sessions rather than grab-bags of scarcely-linked papers. Those who are too polite to leave in the middle of a session will be better able to move around. Jane Jacobs pointed out in The Death and Life of Great American Cities that short blocks make for livelier streets. The point holds here too.

13. Keep Lots of Non-Session Time. The Sunbelt does this nicely; the Paris conference not so well. Most people enjoy and profit from informal interactions more than formal papers. If we consider the papers we present as brief advertisements of our work (like teasers in an intellectual strip-tease), then we can discuss the deep meaning and details of it all informally. That's when people can ask focused, pointed questions; that's when we can let our hair down and admit error and uncertainty. So lots of time between sessions. And four cheers for Russ Bernard's forthright enunciation of Sunbelt principle #1: No sessions during PTH (peak tanning hours).

Some Special Points for International Conferences (which is what all of ours are now)

14. Prepare Many Advance Copies of all Papers. At the Paris conference, there were clear divisions between francophones and anglophones. (The Americans and the French, in that order, were the most unilingual.) People who could only listen in one language daydreamed when the other was spoken. This showed clearly in the questions: Only francophones asked questions (en francais) about papers presented in French. The reverse was true for anglophones.

However, many people read a foreign language better than they understand (often-rapid) speech in that language. They will have less trouble following a speaker if they have a text in front of them. Even if the speaker doesn't read from the text, the order and key points will be the same. Preparing papers in advance will go a long way towards comprehension.

The current trend now internationally is to use English throughout conferences. Many Paris participants noticed that even some of the French, historically the most reluctant, were speaking English. Indeed, a new dialect is forming in the Common Market, "Euro-English," which people from different language groups use to communicate with one another. (English is now the only language accepted for Common Market research grant proposals.)

There is a danger that the spread of English in conferences may give native English speakers the false illusion that all they say is perfectly understood. The fact is that folks such as myself mumble and/or speak very rapidly when we get excited giving our papers. So even if the official conference language is English, full texts of papers are appreciated and often necessary.

15. Use Bilingual or Cross-Langauge Transparencies. At the Paris conference, one speaker (from Germany) gave his talk in English but presented his outline and tables in French. He was truly a master of communication. The anglophones could follow the speech while the unilingual francophones got the gist of it through the transparencies. I did the same thing successfully at the Lyon communications conference. (No mumbling behind my hand.) While it's a major production to translate the entire text of a paper, it's usually easy and cheap to translate a few table captions. For one thing, there's no need to worry about syntax.

The whole thrust of my remarks is that giving a paper at a conference is an important means of communication. You may have more listeners at your session than you will have readers of your future published paper. You will certainly have gotten your message across sooner. (Chuck Tilly always told me to consider a published paper to be the final, "official" notice of what everybody actively in the field would have learned from you much earlier through conferences and working papers.) Too often, people give papers as if they were talking only for their own self-gratification. This is what happened at Lyon. The name of the game is communication, not masturbation!

ARTICLES

A Note on the Relationship Between Centrality and Cultural Knowledge in a Professional Network

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Abstract

This paper examines the relationship between centrality and cultural knowledge in a network of corporate contributions officers, based on data collected by Galaskiewicz (1985b). The results indicate a moderate association between officers' centrality and knowledge of local nonprofit organizations, with membership in professional associations and gender also playing independent roles in the distribution of knowledge.

It has been widely recognized in the social sciences that cultural knowledge in any community is unevenly shared by its members. It also has been frequently asserted that the pattern of social ties in a community underlies intracultural variation. Despite the long held interest in the social distribution of knowledge, a coherent and sustained program of systematic research on the subject has only recently come together.

Work by a number of researchers (e.g., Campbell, 1955; Hammer, Polgar, and Salzinger, 1969; Romney and Faust, 1982; Romney and Weller, 1984; Boster, Johnson, and Weller, 1987; Freeman, 1987; Freeman, Romney, and Freeman, 1987; Krackhardt and Kilduff, 1990; and Boster and Johnson, 1992) has shown that individuals' knowledge about a community's social structure and the characteristics of others is related to their positions in the community's social network.

This body of research has led to the general conclusions that the more people interact with others in the community, the more they agree and know about others in the community, and that the more integrated into a community a person is, the more s/he knows about the community's social structure. However, the available evidence does not indicate what aspect of greater interaction with others it is that increases knowledge of a social structure and others' characteristics. Being more central in a group may allow one to receive more second-hand information about the community's social structure and others' attributes from communicating with one's contacts, which would increase one's social knowledge of the community and its members. It is equally possible, as Linton Freeman pointed out to the author in personal communication, that people in more central positions can better observe, first hand, the community's social structure and others' characteristics, and that communication with others may not be the main source of acquiring this knowledge.

A better context for examining the role of social ties in the transfer of cultural knowledge is in areas of knowledge that do not focus on the social structure or attributes of persons in a community and where verbal communication clearly is at least one necessary part of the process of acquiring knowledge.

Boster (1986) was the first to demonstrate in an explicit network sense that cultural knowledge of non-social content also can be distributed according to the patterning of social ties. He showed that Aguaruna women who were more involved in extra-kin manioc exchange networks had greater knowledge (measured by cultural competence, an estimate of informant knowledge derived from analyzing the pattern of agreement among informants – see Romney, Weller, and Batchelder, 1986) about manioc identification than women whose exchange was limited to their respective kin groups. Deviations from the consensus, however, were patterned along kinship lines, as the women were much more likely to exchange manioc varieties with kin. While shared experience with the actual manioc plants was a component in learning the names for the different varieties, the names definitely could not have been acquired without verbal communication among the women regarding the plants' labels.

Similarly, Brewer (in press) observed that graffiti writers who were centrally positioned (centrality was informally measured) in local graffiti writer networks and who had more ties to writers in other communities knew more (i.e. had greater cultural competence) about the effectiveness of various strategies to control illegal graffiti than more peripheral writers to whom the central writers had first-order links.

This paper adds to the previous research by examining the relationship between centrality in a social network and cultural knowledge using data collected by Galaskiewicz (1985b). First, Galaskiewicz' research on the social distribution of knowledge is reviewed. Next, the procedures of reanalysis are described, and then the results are presented. The final section discusses these findings.

Galaskiewicz' Research on the Social Distribution of Knowledge

The primary focus of Galaskiewicz' research on the social distribution of knowledge has been to investigate how corporate contributions officers decide to which charitable nonprofit organizations (NPOs) they should donate (Galaskiewicz, 1985b; Galaskiewicz and Burt, 1991). Corporate giving officers are responsible for overseeing charitable donations to NPOs in publicly held business corporations (for a more detailed description of the study population, see Galaskiewicz, 1985a, 1985b). Underlying the process of deciding which NPOs to support financially, according to Galaskiewicz and other organizational researchers, is a sense of uncertainty about community needs and the nature and quality of the services provided by prospective donees, since corporations themselves are not the beneficiaries or consumers of the services the NPOs provide. This uncertainty has been hypothesized to stimulate officers to seek more information about NPOs from independent sources, especially peer contributions officers in other corporations, in order to make their contributions decisions effectively. Even when officers do not actively seek out peers for information about particular NPOs, it was thought that officers still acquire a large amount, if not most, of their knowledge about NPOs through communication with other contributions officers.

The data

The main data set analyzed by Galaskiewicz (1985b) and Galaskiewicz and Burt (1991) includes responses from 61 corporate giving officers in the Minneapolis/St. Paul area. All of the officers were employed by firms with more than 200 employees. The data relevant to the present paper are of three basic types: sociometric data, characteristics of the officers and their firms, and officers' evaluations of local NPOs. The sociometric data consist of a 61 X 61 binary nonsymmetric matrix A_{ij} in which a cell has a "1" if the contributions officer (the person most responsible for charitable activities) in firm i reported person-ally knowing someone ". . . involved in corporate contributions, i.e. on a first-name basis, would feel comfortable calling for lunch or drinks after work, etc.," (Galaskiewicz, 1985b: 647) in firm j, or a "0" otherwise. Thus, the data is not exactly of the person by person type. Galaskiewicz and Burt (1991) noted that this network exhibits an overall core-periphery structure.

The data on the officers and firms' characteristics include eleven variables. Seven variables concerning the officers' characteristics are dichotomous: gender, prior work experience in human services, status in firm (whether their job was as a semi-professional or professional contributions officer), whether an officer consults with a peer in another corporation or foundation to get more information on prospective donees (NPOs), and membership in each of three local professional associations for contributions staff (BARC, MCF, WFCP). Data was also collected on officers' educational history (high school, undergraduate, graduate) and birthplace (Minneapolis/St. Paul, North Central U.S., elsewhere). Although not analyzed by Galaskiewicz (1985b) and Galaskiewicz and Burt (1991), the present paper also includes the average assets and revenues for officers' firms between 1979 and 1981 as measures of firms' financial size.

To tap officers' knowledge of NPOs, respondents were presented with a list of 326 NPOs (representing a 20% stratified systematic sample of nonprofit public charities [excluding private foundations and churches] in the Minneapolis/St. Paul metropolitan area) and asked which ones they recognized. In addition, for those NPOs recognized, respondents indicated which were providing essential services and had made outstanding achievements in their respective fields.

Summary of Galaskiewicz (1985b) and Galaskiewicz and Burt's (1991) findings

Galaskiewicz (1985b) found that the more proximate two officers were in the officer network, the more they agreed with each other in their recognition and evaluation of the NPOs. By taking the intersection of A (officer in firm i knew someone in firm j, and vice versa), calculating the path distances between each pair of officers, and

then submitting this path distance matrix to multidimensional scaling, Galaskiewicz obtained a measure of inter-officer network proximity from the resulting interpoint distances in a two-dimensional scaling. He measured agreement between pairs of officers in their recognition and evaluation of NPOs with Jaccard coefficients. This index of similarity can be expressed simply as the number of shared elements (i.e. intersection) in two sets (e.g., NPOs two officers both recognized) divided by the number of items in the union of the two sets (e.g. the total number of unique NPOs recognized by a pair of officers). Galaskiewicz calculated Jaccard coefficients for each pair of officers on each level of evaluation (recognition, essential services, and outstanding achievements). The zero-order Pearsonian correlations between officers' interpoint distances and Jaccard coefficients were .10, .05, and .09 (all $p<.001$ since the dyad was the unit of analysis) for recognition, essential services, and outstanding achievements, respectively.

Galaskiewicz and Burt (1991) extended these initial findings. In their analysis, officers' responses regarding the NPOs were coded on a three category response variable (1 = did not recognize, 2 = recognized, 3 = recognized and outstanding achievements). Galaskiewicz and Burt (1991) employed network autocorrelation techniques and demonstrated, for a subset of ten NPOs which had been given the highest and most variable evaluations, that agreement in recognition and evaluation of these NPOs was associated with structural equivalence (r = .54). This correlation was greater than the one observed between agreement and "cohesion," which was measured by comparing officer i's evaluations with all officers who had direct ties to firm i, r = .29.

They also noticed that more prominent officers (officers' prominence scores were strongly associated with eigenvector measures of prestige and centrality) tended to recognize more of these ten NPOs than less prominent officers.

Purpose of this paper

The reanalysis reported in this paper builds upon the work of Galaskiewicz (1985b) and Galaskiewicz and Burt (1991). The present paper differs in two principal ways by focusing on officers' *centrality* in the network (rather than structural equivalence, dyadic/"cohesive" ties, or network path distance proximity) and their *knowledge* of the NPOs (instead of only agreement in their evaluations). The primary hypothesis tested is whether the information in the sociometric data can predict which officers are the most knowledgeable (regarding the NPOs). Specifically, the hypothesis postulates that officers who are more central in the network should possess greater knowledge of the NPOs. If cultural knowledge is transmitted through social ties involving communication, then positions within in a network where information flow is most focused should also be the loci where cultural knowledge, as accumulated and shared information, is greatest.

Procedure

Four officers' firms did not receive any sociometric choices nor did these officers report knowing contributions personnel at any of the other firms. These four officers were omitted from further analysis because the aim was to observe the distribution of knowledge across a network, and not among unconnected isolates. The 57 X 57 binary nonsymmetric matrix was then converted into a three valued matrix according to the following rule: cell a_{ij} has a "0" if neither i nor j chose one another, a "1" if either i chose j or j chose i, but not both (i.e. an unreciprocated tie), or a "2" if i and j both chose each other (i.e. a reciprocated tie). The rationale for doing this is twofold. First, 63% of the choices in the 57 X 57 binary nonsymmetric matrix were not reciprocated.

The average officer had only 24% of his/her choices reciprocated, with the percentage of reciprocated choices ranging from 0% to 76%. By transforming into a valued matrix, it was not necessary to ignore nearly two-thirds of the sociometric data. Second, Granovetter (1973) points out that in a free-choice sociometric interview, mutual choices can be indicators of strong ties, while unreciprocated choices would tend to reflect weaker ties. Galaskiewicz (1985b) noticed that officers i and j might not know each other personally even when a reciprocated tie exists because they might know other contributions staff who work with the officers interviewed, but not actually each other. A similar scenario could relate to the unreciprocated choices in the data. For instance, officer i could know someone involved in contributions at firm j, but not the officer interviewed, while at the same time officer j was not aware of a colleague's tie with the officer interviewed in firm i. Even if the responding officers did not know each other personally, or were involved in an unreciprocated choice situation as described above, it is assumed in this analysis that there was at least some information flow among contributions staff within the same firm.

Three different measures of centrality were used in this analysis because there was no theoretical indication about which of the specific processes modeled by different centrality measures might best represent the process generally stated in the hypothesis. The first, Freeman, Borgatti, and White's (1991) flow betweenness algorithm, is

based on the role each point plays in terms of network flow for all independent paths between all pairs of points in a valued or binary graph. Stephenson and Zelen's (1989) information centrality index was also used. This measure is based on the inverse of path distances between all pairs of points for all paths, with appropriate adjustments made for overlapping paths and valued ties. Thus, points that are closer (in a path distance sense) to other points and have more connections (greater degree) of higher values with other points will have higher information centrality scores. The third centrality measure employed was Bonacich's (1971) eigenvector measure, which is the eigenvector of the largest eigenvalue of a binary or valued adjacency matrix (i.e. individuals' centrality scores are the loadings on the first factor from a factor analysis of the adjacency matrix).

In this analysis, an officer's cultural knowledge of local NPOs is loosely measured by the total number of NPOs they recognized. This index is similar to the total amount of lexical items in a semantic domain an informant can mention in an open-ended free listing task (e.g. "What are all the kinds of fabrics?"). Brewer, Romney, and Batchelder (in preparation) have discovered that in semantic domains such as birds, countries, diseases, fabrics, and flowers, free listing capacity was correlated approximately .41 with cultural competence (an estimate of an informant's knowledge level based on the pattern of agreement among informants – see Romney, Weller, and Batchelder, 1986) in triads judged similarity tasks. This correlation is probably depressed because in all domains studied there was relatively little genuine variation in knowledge (cf. Weller, 1987). Although admittedly crude, this recognition measure is the only way to gauge knowledge in this data set, since Jaccard coefficients, correlations between respondents on the three category response variable used by Galaskiewicz and Burt (1991), or any other measure of agreement, cannot be meaningfully submitted to any procedure that estimates individuals' knowledge level based on patterns of agreement (cf. Weller, 1984; Boster, 1985; Romney, Weller, and Batchelder, 1986; Romney, Batchelder, and Weller, 1987). This is not to deny that more specific and greater amounts of knowledge are required for evaluation of NPOs beyond recognition; it is just that this information cannot be effectively used in estimating officers' knowledge in this particular case. However, the recognition measure used here does take advantage of officers' responses for all 326 NPOs, in contrast to Galaskiewicz and Burt's (1991) use of the subset of only ten NPOs.

Results

The summary statistics for each of the centrality measures appear in Table 1. There was a substantial amount of variation in the number of NPOs the officers recognized, with a mean of 53.46 and standard deviation of 21.97 (minimum = 5, maximum = 115). The Pearsonian correlations among the centrality measures and recognition are shown in Table 2. Scatterplots of these variables did not exhibit any obvious nonlinear patterns. The total number of NPOs recognized was correlated approximately .5 with the various centrality measures. Therefore, the hypothesis that more central officers should "know" more about the NPOs received moderate support. In addition, all of the centrality measures were highly intercorrelated, though the information index was somewhat different from the flow betweenness and eigenvector measures, which were more strongly correlated with each other.

Table 1. Summary Statistics for Centrality Measures

Measure	Mean	S.D.	Centralization Score
Flow Betweenness	.02	.02	.05
Infomation[a]	.02	.01	< .01
Eigenvector	.02	.09	–

[a] The information centrality scores were computed by dividing each person's information by the sum of all person's information. The centralization score represents the variance of these centrality scores, as suggested by Wasserman and Faust (1992).

Table 2. Correlations Between Centrality and Recognition.

Measure	Recognition	Flow Betweenness	Information
Flow Betweenness	.45		
Information	.50	.77	
Eigenvector	.57	.92	.84

all correlations $p < .001$

The results on the relationship between centrality and recognition were not due to the fact that unreciprocated ties were included in the computation of centrality. For the 39 X 39 binary symmetric matrix based on the intersection of sociometric choices, correlations between recognition and centrality were of the same strength and direction for various measures of centrality: .43 ($p < .01$) for degree centrality, .42 ($p < .01$) for closeness centrality, .25 ($p < .15$) for betweenness centrality, and .34 ($p < .05$) for flow betweenness centrality (Freeman, 1979). Comparable results were obtained when the 57 X 57 binary symmetric matrix based on the union was analyzed. Furthermore, the correlation between recognition and centrality for those ten officers in the valued 57 X 57 matrix who had no outdegrees (i.e. made no sociometric choices) was .56 ($p < .1$), .65 ($p < .05$), and .67 ($p < .05$) for the flow betweenness, information, and eigenvector measures, respectively. For the other 40 officers who had at least one outdegree (sociometric choice), these correlation were .40 ($p < .01$), .43 ($p < .01$), and .56 ($p < .001$) for the same centrality measures. Therefore, even though ten officers made no sociometric choices to other firms, the indegrees to the these officers' firms still carried important structural information that related to the distribution of knowledge.

How good is a correlation of approximately .5 in this case? By comparing the bivariate relationships between other independent variables and recognition, the relative strength of centrality as a predictor of knowledge can be better understood. Consultation with peers regarding prospective donees, birthplace, and education all were unrelated to the number of NPOs recognized in t-tests or analyses of variance, and both assets and revenues of officers' firms were nonsignificantly correlated with recognition. However, several other variables were moderately associated with recognition. Officers who recognized more NPOs tended to be members in one or more of the local professional associations (t = -5.50, df = 43, p.001, eta = .61), female (t = -3.44, df = 13, p = .004, eta = .42), have prior work experience in human services (t = -2.39, df = 14, p = .03, eta = .33), and have professional job status (t = -3.485, df = 50, p = .001, eta = .43)(separate variances used in calculations; nonparametric results virtually identical to those reported here). Thus, centrality was just one of several variables that moderately predicted recognition.

An attempt was made to see which variables provided additional independent information in predicting recognition after controlling for centrality, since some of these variables were also associated with centrality. The partial correlations (controlling for each centrality measure in turn) between recognition and firms' assets and revenues were nonsignificant. For the categorical officers' characteristics variables, t-tests or analyses of variance were carried out on the residuals of the simple regression between recognition and centrality for each centrality measure. Members of local professional associations (p = .004, .014, and .119 for flow betweenness, information, and eigenvector measures, respectively) and women officers ($p < .001$ for all centrality measures) recognized significantly more NPOs than would be expected given their centralities. However, once centrality was controlled for, no differences in recognition remained between subgroups on any of the other variables (all $p > .05$ for each centrality measure, except for human service experience X information centrality - recognition residuals, Mann-Whitney p = .05). Interestingly, gender was not significantly associated with any other variable in the data set.

Despite the earlier listing of association membership as a characteristic of officers, it seems better to view it as a structural variable. Association membership and centrality were moderately related (eta = .58, .65, and .75 for flow betweenness, information, and eigenvector measures, respectively; all t-tests and Mann-Whitney tests $p<.001$). More importantly, membership in one association most likely offered an officer access to some information of local NPOs held by other associations and also to more social ties with other officers because the memberships of the three associations overlapped substantially. This overlap can be seen in the association X association membership matrix in Table 3. Because information seemed to flow relatively easily within an association (". . .they [the associations] provided program activities which allowed these staff people to get to know one another and community problems better (e.g. breakfasts, conferences, seminars, etc.") (Galaskiewicz, 1985b: 647)), it seems plausible that membership in one association allowed an officer access to a substantial amount of knowledge about the NPOs held by members in other associations. This interpretation is supported by the fact that officers who belonged to more than one association did not recognize significantly more NPOs than officers who belonged to only one association. The mean numbers of NPOs recognized for officers belonging to zero, one, two, and three organizations were 42.75, 68.88, 71.71, and 57 (n = 1 officer), respectively. Officers belonging to two or three associations did not recognize significantly more NPOs (t = -.12, df = 16, p = .90) or have greater centrality (t = -.39, df = 13, p = .70) than officers belonging to only one association. Thus, the memberships of the three associations did not compose separate clusters of ties among officers (as did kin groupings among Boster's (1986) manioc cultivators), rather they consolidated the core of the officer network, which presumably homogenized the knowledge base (in terms of recognizing the NPOs) for these more central officers who were members of a professional association. From these data it was impossible to determine whether officers' greater centrality predisposed them to association membership or membership in an association allowed officers to develop additional ties which

produced their greater centrality, or some combination of these two processes. The main point here is that centrality and association membership should be viewed as complementary structural variables, and not as entirely different forces in the distribution of knowledge among contributions officers.

Table 3. Overlapping Association Memberships

	BARC	MCF	WFCP
BARC	18		
MCF	6	12	
WFCP	1	3	3

N = 24 contributions officers who were in one or more associations.

Discussion

The results should be viewed as preliminary and suggestive because of the coarseness of the recognition measure of knowledge and the lack of true person by person information in the sociometric data. Still, the results do indicate that officers' knowledge of NPOs, as measured by recognition, was concentrated in their social network in a manner at least partly described by centrality. In addition, membership in local professional associations (which appears to have structural implications) and gender also were independent factors in the distribution of knowledge among contributions officers.

That gender was so strongly related to recognition was unexpected. Perhaps the women officers tended to be more interested in charity beyond the responsibilities of their jobs and connections to contributions staff in other firms than male officers, and perhaps they paid closer attention to information about NPOs in the local media. It is also possible that women officers spent more time and effort learning about NPOs on their own, apart from their ties to other officers, or that women officers used whatever ties they had with other officers more effectively in learning more about the NPOs than men.

One variable that has been difficult to disentangle from the effects of social structural position on knowledge in past research and in the present paper is the length of experience an individual has in a domain and how long an individual has been a part of the community. While both Boster (1985, 1986) and Brewer (in press) found that structural position and knowledge were related, they also noticed, as did Garro (1986), that more knowledgeable informants also had more experience in the domains and communities under investigation. Variation in officers' recognition of NPOs could very well be due to length of tenure in their jobs and/or length of residence in the Minneapolis/St. Paul area, with more experienced officers more likely to be central in the officer network. Place of birth in the data set analyzed here probably does not index officers' baseline familiarity with local NPOs (separate from their ties to other officers and job duties) very well because of residential mobility. Likewise, prior work experience in human services would probably increase an officer's recognition of NPOs only if that work experience was in the Minneapolis/St. Paul area. Another possible factor in explaining officers' recognition is that officers in some, especially more central, firms may have heard about some NPOs solely because the NPOs themselves had directed their requests for charitable donations to their firms and not others.

Some next steps in research on the social distribution of knowledge should be to collect both behavioral and cognitive sociometric data that measure the strength of dyadic ties. Such sociometric data should be coupled with domain-specific cognitive data that are appropriate for cultural consensus analysis (or some variant thereof) to measure individuals' knowledge levels. In addition, systematic data should be gathered on individuals' length of experience in the community and with the domain under investigation. A more stringent test of the centrality - cultural knowledge hypothesis also would ideally examine a community of people that has multiple subgroupings, instead of an overall core-periphery structure. Boster's (1986) findings with the Aguaruna manioc cultivators (and their kin-oriented exchange structure) suggest that centrality would still remain associated with cultural knowledge in such a multiple subgroup structure.

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Introduction to Network Analysis for Managers

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Authors' Note: This paper was written as a teaching aid for an MBA course entitled "Managing Organizations Through Networks." Our intention was to provide students with a straightforward and non-technical introduction to basic network concepts and to the descriptive analytic techniques of Multi-Dimensional Scaling and CONCOR. Though the substantive focus is primarily on inter- and intraorganizational networks, those teaching in other areas may also find the paper useful. We recommend that this paper be used in conjunction with the UCINET software available from Analytic Technologies, 306 South Walker St., Columbia SC 29205, or STRUCTURE, available from the Center for the Social Sciences, Columbia University, New York NY 10027.

Today the terms network and "networking" are used frequently. During times of personal crisis we often talk about a person's "support network." Many people use their personal computers to connect to world-wide "computer networks." Professionals speak of "networking" – attempts to establish strategic relationships with key people who may be influential to their careers. Yet in contrast to these relatively informal and unspecific meanings that most people conjure up when they hear the term network, a group of social scientists – organizational theorists, sociologists, anthropologists, psychologists, communications researchers, and market analysts – who do what is called network analysis use the term network in a more precise manner. To them, a network is a set of specific relationships linking a defined set of persons, organizations, or even events. Their interest in studying these networks is to identify patterns in the set of relationships and use them to understand and explain the behavior of the individual units and of the system as a whole.

How are these ideas relevant from a managerial perspective? Kotter (1982) provides an answer in The General Managers. After closely observing a number of successful and unsuccessful general managers (GMs), Kotter defined a GM's job in terms of two separate components: a set of technical responsibilities and a set of relationships. Technical responsibilities include setting goals and priorities, securing and allocating the resources (human, financial, and material) necessary to attain those goals, and insuring the efficient use of those resources. However, a GM's ability to meet these responsibilities is highly dependent on his or her relationships with a variety of different persons.

Kotter classifies these persons according to whether they are internal or external to the focal GM's corporation. Internally, a GM maintains relationships with several bosses (10-20) and or members of the board of directors to whom he or she must report. He or she generates support and coordinates joint efforts though relationships with peers (0-dozens). And he or she uses relationships with subordinates (5-15) to "mold them into a team of people that work together well." Externally, a GM's job includes relationships with three groups: (1) financial sources, (2) customers, suppliers, and competitors, and (3) members of the press and public. Although the figures quoted by Kotter represent the average number of persons in each group with whom a GM maintains close relationships, Kotter acknowledges that a GM might typically be acquainted with many more. Indeed, many of the GMs studied by Kotter surrounded themselves with personal networks of hundreds or thousands of individuals. Their specific relationships with these individuals varied widely in both type and intensity, and often transcended formal boundaries.

Kotter found that GMs actively use their networks to implement their agendas. Once they select the appropriate people in their networks, they approach them either directly or indirectly. Direct approaches include subtle ways of asking, demanding, cajoling, or intimidating, while indirect approaches include shaping events and influencing whole groups of people. Compared with less successful GMs, successful GMs mobilize more people and do so with a wider variety of influence tactics.

Kotter's conclusion that GMs' networks greatly affect how they implement their agendas is a specific case of the more general idea that motivates social scientists to do network analysis. Network research is informed by the belief that both the position of individuals in a network and the pattern of relationships between them are critical in explaining both the behavior and attitudes of individuals and of the entire system. More than two decades ago, Mitchell (1969, p. 2) proposed that "... the characteristics of these linkages [among a set of persons] as a whole may be used to interpret the behavior of the persons involved." More recently, Wellman (1988, p. 31) has written, "Structural social relationships are a more powerful source of sociological explanation than personal attributes of system members."

The "personal attribute approach" to which Wellman refers characterizes most of the research done in the social sciences. Historically, the social sciences have followed the natural sciences in pursuing an Aristotelian-Linnean view of the world, most commonly recognized as "the whole is the sum of its parts" (Wellman and Berkowitz 1988, p. 5). As a consequence of this orientation, most research has focused on the individual attributes of each individual in a system, without regard to the existence of linkages between units. Indeed, most commonly used statistical techniques are based on the assumption that the behavior of individual units is independent of the behavior of others. Such analyses assume that individuals are unconstrained and free-floating actors. Any constraints, pressures, or influences from others in the system are regarded as residual errors. This results in unrealistically atomistic descriptions and explanations of social behavior.

In direct contrast, network analysis is part of an emerging orientation within social science called structuralism. Structuralists maintain that what is really interesting and important about social structures and their embedded processes is not the presumed independent behavior of individuals, but instead the ways in which those individuals are influenced and constrained by their social relations to act in certain ways. The isolated actions of individuals are instead augmented, modified, or diminished by the actions of those around them. Structuralists work from the ground up; they start with observed relational behavior, and from that begin to infer the structure of the system.

Wellman (1988, pp. 31-40) cogently summarizes the distinguishing elements of a structuralist approach into five basic principles:

1. "Structured social relationships are a more powerful source of sociological explanation than personal attributes of system members." Because attribute based analyses ignore the specific connections between individuals, they must assume that these linkages are random. However this is clearly not the case – instead, human beings "form attachments to certain persons, they group together in cliques, they establish institutions" (Coleman 1984, p. 88). Furthermore, it is through these attachments that individuals mobilize collective behavior and make appropriate decisions about their own personal behavior. Analyses that obscure this important relational information greatly reduce their ability to understand and explain the behavior of elements in a system.
2. "Norms [commonly accepted "rules" about how people and organizations ought to behave] emerge from location in structured systems of social relationships." For example, much organizational research focuses on the concept of "organizational culture." Such work assumes consensus among a firm's employees as to how they should act. In contrast, network analysis suggests that consensus might not exist, and provides a method for identifying subgroups of employees who may believe differently.
3. "Social structures determine the operation of dyadic [two person] relationships." Many studies of social behavior, especially those within a micro-economic framework, assume that individuals make choices about whom they will interact with so as to maximize their own personal benefit. However, structural analysis reveals that many networks are divided in a manner that restricts individuals' choices regarding whom to interact with. Instead of engaging in the "most" profitable interactions, actors engage in the "best" interactions with those who are accessible to them.
4. "The world is composed of networks, not groups." Standard "attributional" analyses group people together on the basis of similar ethnic backgrounds, gender, religious preference, income, education, etc.. People within a certain group are thereby assumed to act similarly. However, only rarely do such attributional groups exist in isolation. Rather, they are diffused throughout a given population, interacting constantly with members of other attributional groups. People often go to school, work, and church with others who are attributionally different. The network structures emergent from these interactions are thereby the true component parts of the social system.
5. "Structural methods supplement and supplant individualistic methods." Classical statistical analyses are based on the assumption of independence between individual units. Although this independence is consistently violated by relationships between units, individualist analyses cannot examine the effects of these critical interdependencies – they can only infer them. Structural analysis, however, treats these relationships as primordial in effecting the behavior of both individuals and of the system as a whole.

Although much of the initial progress in network analysis was made by academicians, several researchers in corporate settings have recently begun to make important contributions to the field. Much of this work focuses on networks of communication. As firms grow, managers confront the task of facilitating communication between the component sections of their companies. Sheer growth in the number of employees presents problems of coordination, as does diversification and adoption of the multidivisional form of organization. Geographic expansion and separation also introduce unique problems of communication. In addition to these intraorganizational problems of communication, firms face interorganizational problems. Just as individuals are engaged in networks of relation-

ships, firms are similarly engaged in multiple relationships with other firms: business ties, information flows, director interlocks, joint ventures, strategic alliances, etc. Managers face the daunting task of managing a vast network of interpersonal and interorganizational relationships.

In addition to actively managing relationships, research has shown that simply having an accurate cognition of informal networks can provide a basis for power. In a study of a small firm that sells and installs information systems, Krackhardt (1990) found that "those who had more accurate cognitions of the advice network were rated as more powerful by others in the organization" (p. 342). This association remained strong despite controlling for the effects of formal position and network centrality on power. It is not difficult to see why this is true. Those who have an accurate understanding of informal networks are able to spot coalitions and thereby anticipate resistance to specific actions. Moreover, such understanding may reveal weak spots in the network – lack of support for specific people, and splits within a coalition. Knowledge of these help a manager to direct his or her efforts more effectively.

Although network researchers have begun to consider the diagnostic value of network analysis, some are concerned about the potential abuse of knowledge derived with these techniques. Boorman and Levitt (1983) suggest that top management in a firm might use the "masses of relational data buried in organizational files" to "detect structural patterns of interaction and communication" among its middle managers. Unaware employees could thereby be grouped together and, through "guilt by association" reasoning, unfairly denied raises or targeted as being involved in grassroots opposition. A real example of this concern is the fact that the Internal Revenue Service is now using a specific type of network analysis ("blockmodeling") to locate delinquent tax filers or tax evaders (Burnham 1989).

The field of network analysis has grown rapidly, and has established its own professional association (International Network for Social Network Analysis) which publishes an academic journal entitled Social Networks. This growing interest is due not only to the intuitive appeal of the approach itself, but also to the fact that such a wide variety of different empirical structures can be conceived of and analyzed as networks. Although any network analysis must be informed by the subtleties of the specific situation under study, most of the concepts and methods can be used to examine any type of data that can be meaningfully represented in network form. As a result, researchers from every discipline within the social sciences have begun to employ network analysis in their work. This is reflected in the increasing variety of empirical situations studied as networks. The following few examples convey the generalizability of the network approach:

1. Managerial Networks

Successful managers build and manage a vast network of relationships, both inside the firm and out. (e.g., Kotter 1982). Gabarro (1987) found, for example, that the main cause of failure for managers who take charge of a new situation is the failure to develop good relationships. Burt (1992) shows that network-building skills become more and more important the higher up managers go. In fact, in his network study of a large high-technology company, he found that managers who were adept at network-building were promoted faster and at younger ages. And Baker (1992a) shows how managers build and use relationships and networks in a wide range of business areas.

2. Markets as Networks

Baker (1984a; 1984b) has shown that the groups of traders on the floor of a national stock options exchange can be viewed as a social network of individuals connected by many trading relationships. Far from the atomistic (non-network) image of the market in economics, this research demonstrated that traders are structured into cliques, and that the overall structure of the network impacts the volatility of prices.

3. Director Interlocks

One of the first applications of network methods to the field of organizational analysis was the study of director interlocks (e.g., Levine 1972). This work examines interorganizational structure by conceiving of it as a network in which entire organizations are the most basic units. Ties between organizations are created by one organization placing one of its executives or directors on the board of directors of another firm. These interlocking directorate ties can serve as conduits for important information and influence.

Recent work by D'Aveni and Kesner provides a convincing example of the importance of relationships between corporate directors in determining corporate outcomes (Berg 1990). These researchers found that takeover deals are more likely to be friendly if the directors of the target company are prestigious and well connected to

directors in other companies. A target company's well connected directors represent part of the assets of that company, and will be treated correspondingly well by a bidding company. In addition, directors who are well connected are also likely to be powerful enough that they can cooperate with a bidder more easily than directors who are less powerful.

Davis (1991) demonstrates the importance of director interlocks in the diffusion of the "poison pill" takeover defense. By studying the spread of the pill throughout the Fortune 500, he found that a firm was more likely to adopt this takeover defense if many of its outside directors sat on boards that had already used it. Director interlocks acted as information conduits through which top executives could learn about such innovations as the poison pill.

4. Business Transactions between Firms

Business transactions between firms are another type of interorganizational relation that can be studied using network analysis. By analyzing a large population of firms and their investment banks, Baker (1990) found that corporations intentionally manipulate the number and intensity of business ties with banks to improve the efficiency and effectiveness of bank relationships.

5. National Policy Making

Network analysis has been effectively applied to the study of decision-making within national policy domains by Laumann and Knoke (1987). These authors conceive of a policy domain such as Health or Energy as a complicated network of influential actors and important policy-making "events." By analyzing these networks, Laumann and Knoke showed that each of these two domains consists of a large, exclusive, highly differentiated community of policy-making organizations. Rather than consistent decisions intended to maximize the public good, policies "are the product of decentralized contention among a plurality of organizations seeking to satisfy their interests by influencing public authorities" (Laumann and Knoke 1987, p. 380).

6. International Trade Networks

Snyder and Kick (1979) conducted a network analysis of the entire world economy in which each country was considered as an individual unit, connected to other nations by relations of economic exchange, diplomacy, and antagonism. These authors showed that certain countries lie in the center or "core" of this world network, while others are located on the semi-periphery or periphery. Because the countries at the periphery have fewer structural opportunities to engage in trade than those at the core, peripheral countries are forced into dependent relationships with core countries. These dependencies subsequently affect the economic development and political climate of peripheral countries.

7. Organizational Communication Networks

Traditionally, large organizations are described in terms of formal hierarchies of reporting relationships. However, many researchers have challenged this view, contending that the formal organization of a firm does not describe how that organization actually functions. Instead, important relationships emerge across formal organizational boundaries. These cross-linkages can "dominate and define the way the organization actually works" (Netmap International Inc. 1988, p. 1).

Several pieces of research document the importance of communication networks within individual companies. For example, Krackhardt and Stern indicate that although friendship ties within individual departments of a firm improve employees' daily working conditions, the number of friendship ties across departments is critical in determining how well the organization can respond to crisis. Employees with more interdepartmental ties are more likely to "share a wider, more organizational view of the world" (Krackhardt and Stern 1988), and will be more likely to engage in cooperative behaviors.

The convincing conclusion of such academic research that communication networks are important in corporate functioning has led at least one consulting firm, NETMAP International, Inc., to create a service called ORGMAP, which it describes as a methodology for "analyzing organizational structure, based on the study of communications flows, decision-making processes and task functions within an organization" (Netmap International Inc. 1988, p. 1). NETMAP takes a wholly diagnostic orientation to network analysis, in which their goal is to assist companies in working toward a more efficient structure.

8. Networks of Professionals

Groups of doctors, lawyers, professors, and other professionals are easily studied as networks. Several types of ties exist between colleagues: referrals, advice, and collaboration are common examples. The resulting networks can then be used to explain phenomenon such as how innovations are adopted into a specific profession (Coleman, Katz, and Menzel 1966).

Robert Nelson (1988) used this approach as part of his study of five major Chicago law firms. Within each firm, Nelson collected data on which lawyers had worked together on projects during the past year. Based on preliminary observations in the firms, Nelson determined that two of the firms are bureaucratically organized, while the other three are more traditionally organized. His analysis of the "project collaboration" networks within each firm indicated that the bureaucratic firms contain more "clearly identified and internally cohesive" work groups than the traditionally organized firms. However, in contrast to the popular proposition that bureaucratic organization results in a "deskilling" of the work process, Nelson's analysis revealed that this is not the case. Instead, both types of firms are specialized in the same manner, and delegate tasks and responsibility in a similar fashion. But lawyers in the bureaucratic firms are more satisfied and committed to their work than their counterparts in the traditional firms.

In the section that follows, we define the scientific term network and contrast it with more colloquial meanings. Several different types of networks are described, and the process by which an empirical social situation can be conceptualized as a network is illustrated. The next section presents many of the formal terms and concepts used by researchers to describe and explain network structure. Finally, a third section introduces two descriptive methods for examining network data, both of which are demonstrated on the same dataset. Important differences between the two techniques are identified, and the results of each are interpreted and discussed.

I. What Is a Network?

Imagine the group of people employed by a small firm. At any given point, there are several different relations each of which define a unique network among members of the group. Relations such as "joint work" on the same project, "membership" on the same committee, "antagonists" over company policy, and "friendship" may all exist in a variety of cross-cutting patterns among the employees. After a period of time, a complex web of relationships will exist among the group. The first step in using network analysis to study the dynamics of a situation like this one involves parceling out and identifying those specific networks that are relevant to the problem at hand.

The number of possible types of relations is almost limitless. Many types of relations are context specific; they are formed and maintained in response to specific events. Others arise as the result of ongoing interaction. Often, network researchers are interested in more than simply distinguishing between different types of ties. Upon restricting themselves to a given type, they then attempt to measure the finer characteristics of each individual tie. Therefore, friendship ties might be characterized according to their strength, frequency of contact, or perceived importance to the individuals involved.

People usually observe networks as they originate either from themselves or from some other focal individual. Networks originating at an individual and including only persons to whom that individual is directly or indirectly tied are referred to as egocentric networks. For example, an egocentric communication network consists of "those interconnected individuals who are linked by patterned communication flows to a given individual" (Rogers 1983, p. 295). Egocentric networks are not necessarily the result of a focal individual's strategic planning — thus, a network is not equivalent to "networking." One can begin to imagine each person they know as being surrounded by an egocentric network through which they receive information and are subsequently influenced to behave in certain ways. Furthermore, the relationships between a focal individual and the others to whom he or she is connected vary considerably in both quality and strength. The result is that the information received by the focal individual from one person may not be as important or influential to him or her as information that he or she receives from another.

In a now classic piece of research, Granovetter (1974) described the process by which people in a Boston suburb gathered information about job opportunities. Contrary to conventional wisdom, he showed that most people learned of job opportunities not from close friends but instead from more distant acquaintances. Although close friends are more frequently seen, they are less likely to know of opportunities that an individual does not know about already. However, people's "weak" ties connect them to others outside their immediate circle of friends

and subsequently provide important information that they would not have otherwise received. Granovetter also discovered that those who found out about jobs through weak ties ended up with better jobs and were more satisfied than those who used other means.

Most people are surrounded by a group of immediate others with whom they interact frequently and from whom they receive varied types of support. Wellman, Carrington, and Hall (1988) studied such "personal communities" of people living in East York, a suburb of Toronto. The authors found that these networks provided individuals with a sense of belonging, emotional aid, and services such as help with home-related tasks or loans of money. However, contrary to the assumption that people form their community relationships based on interpersonal attraction, a high percentage of East Yorkers' personal relationships were with those with whom they were compelled to interact: neighbors, kin, and coworkers.

It is important to realize that the total number of persons known to a given individual can be quite large. For example, Pool and Kochen (1978) measured the total number of acquaintances maintained by several individuals during a 100 day period. The figures varied widely, from a housewife who had seen 72 people during the past 100 days to a lawyer-politician who had seen 1,043 people during the same period. Using these figures to estimate an individual's total number of acquaintances, they concluded that a subject who had contact with about 700 people during 100 days maintained a set of about 1500 persons whom he or she knew actively at that particular time. With each person knowing so many other people, it is unlikely that an individual could keep track of the egocentric networks of even a couple of his or her close friends.

Although some areas of research are concerned with examining egocentric networks, many network analyses focus on sociocentric or whole networks, in an attempt to determine the position and subsequent role of individuals or organizations within a larger system. Every whole network is essentially composed of several overlapping egocentric networks, one for each individual in the group. Analysis of whole networks is important in understanding not only the behavior of individual units, but also several systemic properties, such as how quickly information can diffuse throughout a network, or how effectively a group can respond in certain situations.

All organizations can be represented as networks. For example, bureaucracies consist of hierarchical networks of reporting relationships between formal positions of authority. In contrast, more fluid and flexible structures can also be conceptualized as networks. Research by Eccles and Crane (1988) revealed that investment banks are organized as dynamic and flexible networks that are well suited to the turbulent nature of the banking industry. Baker (1992b) studied a very successful commercial real estate firm that also organized itself as a dynamic network and used formal network analysis to measure the integration of the firm.

Many whole networks are not explicit but are instead implicit and emergent. Although the mechanism by which individual ties are established may be explicit and understood, the actual patterns of ties that result are often unknown to those involved. For example, each citizen in a given town is acquainted with several others. In addition, each person often has some rough impressions about how their acquaintances are acquainted. However, it is highly unlikely that any one individual could describe the actual structure by which all of the town's citizens are connected. Most people do not know or comprehend the overall networks in which they are embedded. Network analysis, however, permits an analyst to know and understand a network better than any of its participants.

II. Basic Network Concepts

Networks may be represented in several different ways, the simplest and most intuitive of which is called a sociogram. Sociograms are drawings that show the individuals within a network and the actual ties between them. For example, consider a hypothetical group of eight people who work together in the same office. Over time, it is likely that they will have formed friendships among themselves (as well as a variety of other types of ties). One possible friendship network that might form among these eight co-workers is described by the sociogram in Figure 1:

Sociograms such as this one consist of a set of points, some of which are connected by lines. Because these two elements also define what mathematicians refer to as a graph, network analysis has adopted several terms from graph theory to describe network elements and structures. Below we describe some of the basic concepts of graph theory as applied to the analysis of social networks. The interested reader should refer to Harary, Norman, and Cartwright (1965) for a more thorough and technical treatment.

In a graph, each individual unit is represented by a unique point or node. Nodes are often labelled with numbers or letters. In the graph above, each node represents an individual person working in the office. In other graphs, the nodes might represent corporations, industries, or entire countries. Relationships between nodes are called either ties or links. Ties can be either direct or indirect. In our example, there is a direct tie between nodes 1 and 4. In addition, there are ten other direct ties connecting pairs of nodes. When referring to a graph such as

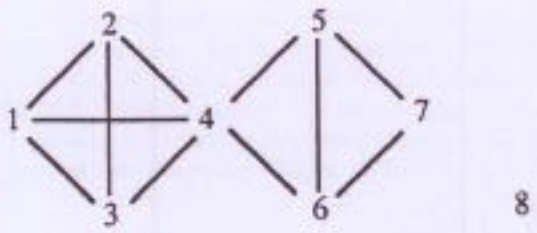

Figure 1. An hypothetical sociogram.

this one, a direct tie is formally called an edge. Two nodes connected by a single edge are said to be adjacent. The edge between nodes 1 and 2 together with those between nodes 2 and 3 and nodes 3 and 4 constitutes an indirect tie between nodes 1 and 4. In a network that is densely connected, there are typically many indirect ties connecting a single pair of nodes.

Although all of the edges in this graph are drawn as non-directional, it is frequently appropriate to incorporate directionality between nodes. Consider a population of medical doctors each of whom is a specialist in a particular field. In a network of referrals connecting these physicians, a tie between two nodes might represent one physician referring a patient to another. The directionality inherent in each individual act of referring can be represented in a graph by including an arrow at the appropriate end of each edge. A graph in which the edges are directional is called a digraph. In addition to directionality, the strength of individual ties is also sometimes represented by placing a number next to the corresponding edge. In the network of physicians, for example, a number next to an edge might represent the total number of patients who had been referred by a particular doctor to another over an extended period of time.

A path is a consecutive sequence of edges linking a pair of nodes. Therefore, all direct and indirect ties are also paths. One node is said to be reachable from another if there is at least one unbroken path between them. In Figure 1, node 8 is not reachable from any of the other nodes, and is therefore referred to as an isolate. The minimum number of consecutive edges (shortest path) that must be crossed in order to go from one node to another is the geodesic between that pair of nodes. The geodesic between nodes 1 and 6 is two, while the geodesic between nodes 1 and 7 is three. If a node lies on the geodesic between a pair of nodes, then it is said to be between them. For instance, node 4 is between nodes 1 and 5.

A node is called a cut point or critical node if removal of that point would result in a disconnected graph. The significance of critical nodes is usually as liaisons or brokers within the network. In Figure 2 below, node 4 is clearly a critical node because its removal results in two disconnected subgroups. Similar to the definition of critical nodes, an edge is called a bridge if its removal results in a disconnected graph. In the example below, the edge between nodes 3 and 4 constitutes a bridge since removal of that line would again result in two disconnected subgroups.

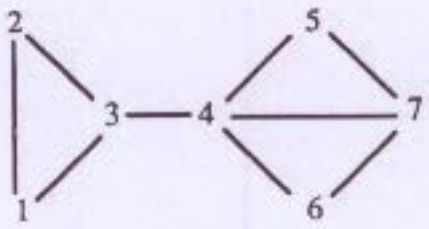

Figure 2. Demonstration of critical node and bridge.

Although sociograms allow exploratory visual analysis of network data, they are cumbersome and inefficient to work with, especially for large networks. For this reason, researchers represent network data in the form of matrices. The matrix corresponding to the graph in Figure 1 is shown below:

	1 2 3 4 5 6 7 8
1	0 1 1 1 0 0 0 0
2	1 0 1 1 0 0 0 0
3	1 1 0 1 0 0 0 0
4	1 1 1 0 1 1 0 0
5	0 0 0 1 0 1 1 0
6	0 0 0 1 1 0 1 0
7	0 0 0 0 1 1 0 0
8	0 0 0 0 0 0 0 0

In a matrix, each node is represented by a unique row and a corresponding unique column. Data such as those in Figure 1 can be represented by a binary matrix in which a one indicates the presence of a tie, while a zero indicates the absence of a tie. Such binary matrices are also called adjacency matrices. In the matrix above, the one in column two of row one indicates that node 1 is directly connected to node 2, while the zero in column five of row one indicates that node 1 is not directly connected to node 5. Since the ties in this example are non-directional, there is also a corresponding one in column one of row two indicating that node 2 is also directly connected to node 1. In fact, the entire matrix is symmetric across the diagonal that runs from the upper left corner of the matrix down to the lower right corner. Matrices representing data in which all ties are non-directional are always symmetric across this diagonal.

Frequently data matrices are not initially symmetric, especially those that contain data on relationships between individual people. This may be true even if the relationships being studied are theoretically non-directional, due to the way in which relational data are usually collected. Many researchers collect data with a questionnaire or an interview in which each respondent is asked to name those persons with whom he or she has a particular relationship. Since respondents are not prompted or forced to name each other, the resulting raw data matrices are often non-symmetric, indicating that although Person A named Person B, Person B may have forgotten to name Person A. Matrices that represent data collected in this fashion are called chooser-chosen matrices, and follow a convention where each entire row represents the choices made by an individual person.

Not all matrices are binary. In fact, different matrices typically contain a variety of data all characterizing the relationships between pairs of individuals. For example, matrix entries can represent the total number of transactions of a certain type between two traders during a specific period of time. Distance matrices contain a number characterizing the distance between pairs of actors. The most common distance matrices are those which represent the graph theoretic distance, or geodesic, between each pair of actors. Similarity matrices and dissimilarity matrices contain values indicating the similarity or dissimilarity of each pair of actors, respectively. (Methods for calculating scores representing the similarity or dissimilarity of actors in a network are introduced in the following section.)

Once a data matrix is constructed, some simple descriptive measures can be obtained by summing matrix entries within rows and columns. The degree of a given node is the number of other nodes adjacent to it. By extending this concept, the outdegree of a node is the total number of direct ties from that node to all others. Given an adjacency matrix, the outdegree of a single node can be calculated by summing up all of the entries within the appropriate row. Similarly, the indegree of a particular node is the total number of direct ties from all other nodes to it. This is calculated by instead summing up all of the entries within the appropriate column. These sums are also referred to as row and column totals. For symmetric matrices, an actor's indegree and outdegree are always equivalent. However, in asymmetric matrices the indegree and outdegree can be interpreted separately. For example, in chooser-chosen matrices an actor's indegree is typically viewed as a measure of that actor's popularity.

One of the most central concepts in network research is that of a clique. A clique can be loosely defined as a highly cohesive subgroup of actors within a larger network. A cohesive subgroup of actors is one in which all members are densely connected to each other, but minimally connected to actors outside that particular set. Brief-

ly, the theoretical rationale that motivates researchers to identify and analyze cliques lies in the fact that actors in a clique share a disproportionately large amount of information and experiences among themselves, and are therefore likely to behave similarly and act together.

Although the informal concept of a clique is likely a familiar one, identifying cliques within an empirical network is much more involved. The most stringent definition of a clique is a maximal complete subgraph – a set of three or more nodes in which all possible pairs are directly connected and are not part of a larger such set. In a maximal complete subgraph with N nodes, there are a total of n(n-1)/2 edges (for a digraph, this number is multiplied by two). In the graph in Figure 1, there are three such cliques: nodes 1, 2, 3, and 4; nodes 4, 5, and 6; and nodes 5, 6, and 7. This example illustrates a frequently encountered problem in network analysis – few networks can be separated into neatly defined non-overlapping cliques. When faced with this problem, researchers either search for other ways to identify clique boundaries or question the appropriateness of separating the graph into cliques.

In reality, very few empirical networks contain maximal complete subgraphs of more than three or four persons. Limited data collection methods, errors in personal reporting, and simple random variation all result in at least a few missing ties in even the most dense cliques. Therefore, several researchers have proposed alternative definitions of cliques that are less restrictive than that of the maximal complete subgraph. For example, one such relaxed definition employs the graph theoretical concept of a maximal strong component. A maximal strong component is a network subgroup in which every actor is at least reachable from every other, and no additional actors can be added to the group without violating its mutual reachability.

There are several summary measures that are used to describe whole networks. One frequently used measure is network density, calculated as the ratio of actual ties in a network to the maximum possible number of ties (n(n-1)). Since the maximum number of ties increases at a much faster rate than the number of nodes, smaller networks tend to have higher densities than larger networks. Network density has important consequences for several aspects of group behavior, such as how quickly and easily information can diffuse throughout the group. Another summary measure often used is that of network centrality. Centrality is first calculated at the individual level – each individual's score indicates how "central" he or she is in the network. There are several distinct measures of an individual's centrality, each with different theoretical and practical implications. The most straightforward is simply the ratio of actual ties involving an individual to the maximum number possible (n-1 for a non-directional graph). This degree-based measure of centrality reflects the potential amount of communication activity of an individual (Freeman 1979). Centrality scores for individual nodes may then be aggregated into group level measures that describe the distribution of individual centrality scores in the network. For an in-depth treatment of this and other measures of centrality, see Freeman (1979).

III. Descriptive Analyses of Networks

One basic goal in network analysis is to identify the relative positions of individual nodes in a network, the presence of subgroups, and the overall structure that emerges from the way that those subgroups are interconnected. From sociograms like those in the previous section, one can already begin to identify and describe several interesting features of a network's structure. Indeed, constructing sociograms was the only available method for doing network analysis fifty years ago. However, there are two major drawbacks to sociograms as a method for analyzing networks. The first problem is that the only way to calculate positional properties such as the geodesics between pairs of actors or a specific clique structure is to search for each edge and indirect tie by hand. Not only is this process time consuming – it is also prone to errors on the part of the researcher. These problems make it virtually impossible to analyze a large network using a sociogram.

The second problem is that, for any given network, an almost limitless number of different sociograms can be constructed that include exactly the same relational information but suggest radically different positions and network structures. No matter where each point is drawn on the page, the appropriate ties can still be filled in. For example, placing a subgroup of points relatively close together may be useful in identifying a clique, but in a sociogram the actual distances between the points are based solely on the subjective interpretation of the researcher. Sociograms offer no systematic way to determine what these relative distances should be, and therefore impose no standard on a given analysis so that it can be compared to others.

These serious limitations to sociograms have motivated network analysts to develop new techniques for describing and analyzing networks. This work has produced a variety of different techniques for condensing and reducing the information contained in a sociogram in order to reveal the underlying patterns. Since these different techniques reveal different aspects of the data, results based on them are not substitutable. Thus, the researcher must carefully consider the specific nature of the data being analyzed and the technique(s) being used in order to

draw accurate and useful conclusions. In some situations, only one technique may be appropriate – in others, the use of several techniques may enrich one's understanding of the data. In all cases however, network analysis is more than simply a "recipe" of procedures to be methodically followed – it is instead an investigative endeavor requiring careful thought and critical judgement.

Two Approaches: Subgroup Cohesion versus Structural Equivalence

Most techniques for reducing network data into a more interpretable form can be classified into one of two types, according to the way in which the positions of individual nodes are determined relative to the others in the network. The more intuitively understandable of the two is often referred to as a subgroup cohesion or clique-based approach. According to this approach, nodes are grouped together on the basis of the frequency and strength of ties among them. For example, in a network of friendship relations, two very good friends would be located very close to each other, while two avowed enemies would be located far apart.

In contrast to cohesion-based reasoning, network analysts have also developed an approach to studying network structure based on the concept of structural equivalence. The structural equivalence of any two nodes in a network depends not on the ties between them, but instead on the similarity of each node's profile of ties with other members of the network. Two nodes are structurally equivalent if they relate to all other actors in the network in exactly the same way. "From the point of view of the logic of the structure, then [the two nodes] are absolutely equivalent, they are substitutable" (Lorrain and White 1971, p. 63). Based on the criterion of structural equivalence, two persons would be located near each other only if all of their third party relationships were the same. Like the strict definition of a clique, a strict definition of structural equivalence is rarely useful in analyzing empirical data. Therefore this definition is, in practice, also relaxed. Typically, some cutoff value representing the degree of similarity of two individuals' ties with all third parties is specified.

A structural equivalence approach can be used to expand the variety of empirical situations that can be effectively conceived of and studied as networks. For example, in his book Corporate Profits and Cooptation, Burt (1983) represented the American economy as a "network of exchange transactions between persons and corporate bureaucracies as actors in the economy." Burt provided a structural equivalence definition of an industry. Firms that produce the same commodities will have similar relations both from other actors (suppliers) and to other actors (consumers) in the economy. Note that a cohesion-based definition would not apply here because competitors do not transact with one another. Based on structural equivalence, Burt then aggregated similar organizations into industries. He studied relationships among these industries as an "input-output [matrix] representing unique patterns of market transactions" between individual industries (Burt 1983, p. 10).

Burt proposed a model of "structural autonomy" in which firms in an industry are autonomous if there is low competition within that industry, yet extensive competition among that industries' suppliers and consumers. Firms with greater autonomy are better able to control industry prices and should obtain high profits. Indeed, Burt's analysis of market structure and profit data on American manufacturing industries indicated higher profit margins for industries characterized by high structural autonomy.

The real difference between subgroup cohesion and structural equivalence lies "in their differential emphasis on [relationships] within or between subgroup actors" (Knoke and Kuklinski 1982, p. 60). Although these two approaches are quite distinct, they should not be thought of as entirely contradictory. Rather, they represent different ways to conceive of similar problems. Often, the type of data and the specific nature of the questions that the researcher is trying to answer dictate using one approach or the other. For example, if one is interested in how the information transmitted in face-to-face interactions diffuses through a network of acquaintances, one would probably want to analyze that network according to the criterion of subgroup cohesion. In contrast, if one is interested in determining the similarities among advertising firms relative to their clients and media venders, one might analyze a two-population matrix of advertising firms by clients and venders according to structural equivalence. Yet unlike these two examples, the decision between cohesion and structural equivalence is sometimes an ambiguous one. In fact, one can often gain insights about a cohesion-based analysis from a structural equivalence analysis of the same data, and vice versa. Generally, a good rule to follow is to always analyze your data according to both criteria, unless one is illpreviously not be ogical or impossible.

Within each of these two general approaches, several specific techniques and algorithms have been developed. In the next section, we discuss two of these. The first, multi-dimensional scaling, can be used within both approaches, while the second, CONCOR, is used exclusively for determining structural equivalence. A third set of procedures that we will not discuss here are those that identify cliques within networks.

Figure 3 organizes these three procedures within the two general approaches:

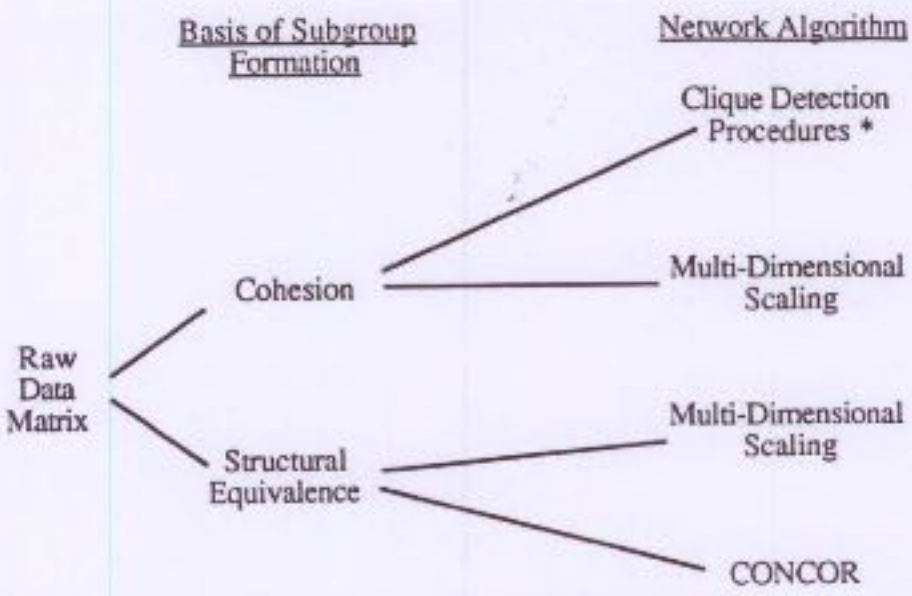

Figure 3. Stages involved in standard network analyses.
*Several computer programs, such as NEGOPY, have been developed to identify different types of cliques.

This diagram is merely intended as a cognitive aid to organizing the material. We do not wish to underemphasize the creative component of the analysis process, and although new software has made it possible to punch a few buttons and get "the result," we strongly caution the reader against thinking about network analysis in these terms.

An Empirical Example

The remainder of this section is devoted to introducing some real network data and applying some of the procedures summarized in Figure 3. The reader should pay particular attention not only to the specific steps involved, but also to the substantive rationale behind each analysis and the interpretation of the results.

The data were collected from a group of the fourteen most prominent political actors in a Midwestern County during 1985 (these data were originally collected by Doreian and Albert [1986]; the description and analyses presented here are adapted from Doreian [1988]). Of these fourteen, seven comprise the current County Council which is the county's legislative and taxing body. This council was created and its first members elected in 1980 under a new Home Rule Charter. All council members including the president must be reelected every four years. The first president and one other original council member lost reelection bids in 1984 and were replaced. Despite this they remain powerful leadership figures in the community, especially the former president. In addition to these nine former or current council members, the researchers identified five other prominent figures. The County Executive is the chief executive officer of the county, and is assisted by an elected Auditor and elected Sheriff. The Sheriff is not only the county's chief law enforcement official, but is also in charge of the county jail. The County Prosecutor is the county's chief legal officer, as well as a member of the county budget committee. The fourteenth political figure is the City Mayor.

The present county jail has consistently failed state inspections, and has been placed by a Federal Court under signed consent decree to improve its conditions. Yet despite this critical situation, the council's response has been one of prolonged inaction. In a vote conducted in December 1984, the council's response to a proposal to build a new jail was as follows: Councils 1, 2, 3, and 4 all voted for a new jail, while Councils 5, 6, and the Council President all voted against. In 1985, the County Executive sought to consolidate his power by replacing several elected positions, including that of the County Auditor, with appointed positions. In addition, he wanted to begin

construction on a new jail. The Auditor responded by voicing opposition to the new jail, even though he had no legal authority to oppose the Executive. The council remained divided as to whether or not a new jail should be built.

These fourteen political figures were almost all white (13 of 14), male (13 of 14), and Democratic (12 of 14). Subsequently, none of these standard "attribute" variables can explain the persistent division between proponents and opponents of the proposed jail. In response, the original researchers hypothesized that the group was segregated into separate camps based on political ties between individuals. They hypothesized further that membership in one of these camps was the determining factor in council members' support or opposition to the new jail. The data they collected consists of a record of the presence or absence of strong political ties between each of the fourteen political figures. Strong ties were defined as those across which actors both gave and asked for political support. The corresponding binary chooser-by-chosen matrix containing the raw data is shown below:

		A	B	C	D	E	F	G	H	I	J	K	L	M	N
Co. Executive	(A)	0	0	1	1	0	0	1	0	0	0	0	0	1	0
Co. Auditor	(B)	0	0	0	0	0	0	0	1	1	1	0	1	0	0
Sheriff	(C)	1	0	0	1	0	1	1	0	0	0	0	0	0	1
Council 1	(D)	1	0	1	0	1	1	1	0	0	0	0	1	0	0
Council 2	(E)	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Council 3	(F)	0	0	1	1	1	0	0	0	0	0	0	1	0	1
Council 4	(G)	1	0	1	1	0	0	0	0	0	0	0	0	0	0
Co. President	(H)	0	1	0	0	0	0	0	0	1	1	0	1	1	0
Council 5	(I)	0	1	0	0	0	0	0	1	0	1	0	0	1	0
Council 6	(J)	0	1	0	0	0	0	0	1	1	0	0	0	1	0
Form. Council	(K)	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Form. Co. Pres.	(L)	0	1	0	1	0	1	0	1	0	0	1	0	1	0
City Mayor	(M)	1	0	0	0	0	0	0	1	1	1	0	1	0	0
Co. Prosec.	(N)	0	0	1	0	0	1	0	0	0	0	0	0	0	0

Applying the Subgroup Cohesion Approach

Since the ties in this network represent exchanges of political support, it is reasonable to ask whether there are any cliques of individuals who share political support only among themselves. To answer this question, the subgroup cohesion approach is appropriate. Referring back to Figure 3, there are two standard alternatives within subgroup cohesion. One involves submitting the raw data directly to one of various clique detection programs. Although several of these programs can be used productively, each one operates according to different criteria. Therefore, there is not sufficient space in this monograph to discuss them; they are not emphasized in the course.

A second alternative within the subgroup cohesion approach is a popular procedure called multi-dimensional scaling (MDS). Stated simply, MDS is a family of data reduction techniques that use inter-point distances to plot a set of points. For example, consider a table of flying distances between major U.S. cities, like those often given in the back of an atlas. Although this table provides a lot of detailed information, it would be nearly impossible to get an overall sense of where the cities are located relative to each other by simply looking at the numbers. The purpose of MDS is to use that matrix of distances to reconstruct a two-dimensional plot (or map) of the cities.

In this example, the fact that the cities exist on a relatively flat surface insures that the matrix of flying distances will correspond closely to a two-dimensional plot (this would not be true if we were plotting cities of the world). However, with network data this is rarely the case. Therefore, MDS routines are used not only for plotting a set of points based on their interpoint distances but also for reducing the dimensionality of the data. Typically, MDS is used to create plots in at most three dimensions, since four and higher dimensional solutions cannot easily be examined visually. Two ways of handling this reduction of dimensionality give rise to two different types of scaling: metric scaling, which attempts to reproduce the original distances exactly, and non-metric scaling, which attempts to reproduce only the rank ordering of the original distances in the solution. Measures referred to as

stress and alienation are used to evaluate the discrepancy between a given solution and the original data – in practice, many sets of data may be represented adequately in three or fewer dimensions.

For our purposes here, the specific methods by which MDS algorithms achieve solutions are not especially relevant. Most algorithms should achieve similar solutions when used on the same data, and given the potential for error in data collection and the "approximate" nature of the MDS technique, attempts to interpret local areas of a solution in great detail are usually unwarranted. Computational details are important however if one wishes to convince him or herself or others of the validity of the technique, compare two or more scaling routines, or explore the relationship between scaling and other multivariate procedures. We suggest that the interested reader consult one of the many texts on multivariate analysis; the levels of difficulty vary considerably, but most devote a section to MDS. In addition, the book Introduction To Multi-Dimensional Scaling by Schiffman, Reynolds, and Young (1981) provides an in-depth yet easily accessible discussion of several different types of scaling and the algorithms that have been developed to perform them. Finally, McFarland and Brown (1973) contains an important discussion of issues involving the application of scaling to social network data.

The political data are in the form of a binary chooser by chosen matrix, and so distances between actors must be calculated before MDS can be used. An intuitively reasonable choice for these distances are the geodesics between two actors. Through matrix multiplication, the adjacency matrix can be easily converted into a distance matrix of geodesics (for details, see Harary, Norman, and Cartwright [1965, pp. 134-8]). However, since the raw data matrix is not completely symmetric, rather than a unique geodesic between every pair of points, matrix multiplication yields two distinct geodesics – one from the first point to the second, and another from the second to the first. Therefore, the raw data matrix must first be symmetrized. One method for doing this is to "fill in" the corresponding reciprocal choices that were not reported in the original data. Another method is to eliminate unreciprocated choices. Which method you choose should depend upon the exact nature of your research questions. In this case, political support is a tie that is likely to be reciprocated, or at least not antagonistically non-reciprocated. Therefore, we can substantiate "filling in" unreciprocated ties. After the matrix has been symmetrized, we can then compute the geodesics (using standard network computer programs) and submit this distance matrix to a multi-dimensional scaling routine. The results of this analysis (using non-metric scaling) are presented below in Figure 4:

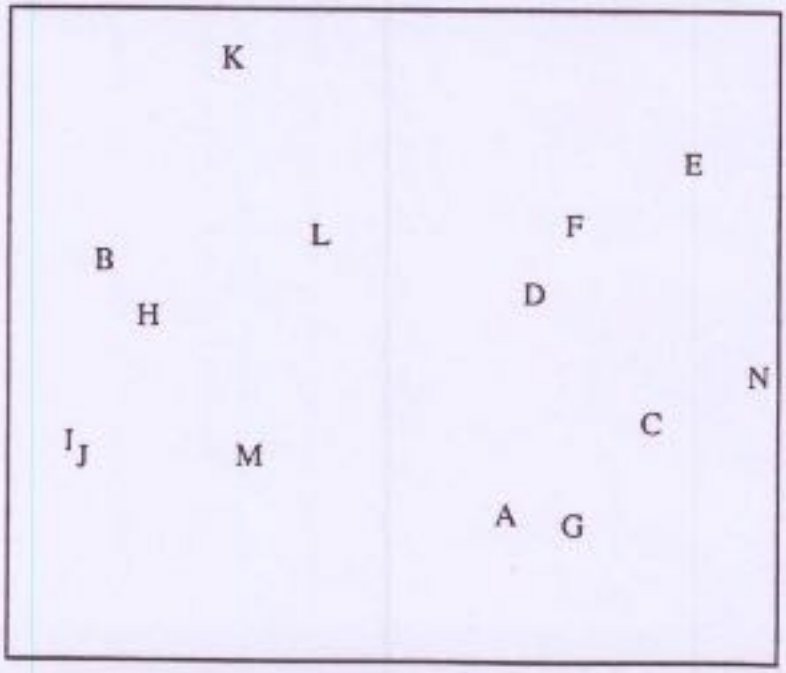

Figure 4. MDS representation of graph theoretic distance.

The location of each letter represents the location of the corresponding individual (refer to binary matrix on p. 22). Although the absolute distances between points are of little significance, the relative distances between them are indicative of the relative length of the paths between them. This allows one to identify cliques by looking for clusters of closely grouped points. The most prominent pattern in Figure 4 is a vertical division of the graph into two distinct halves. Consistent with the hypothesis of the original researchers, the right group contains the point A (Executive), while the left group contains the point B (Auditor). Furthermore, those members of the council who voted in favor of the new jail (D, E, F, and G) are all contained within the right group, while those members who voted against the new jail (H, I, and J) are contained within the left group.

Often, it may be useful to overlay the actual ties between actors upon an MDS representation. Figure 5 includes these direct ties:

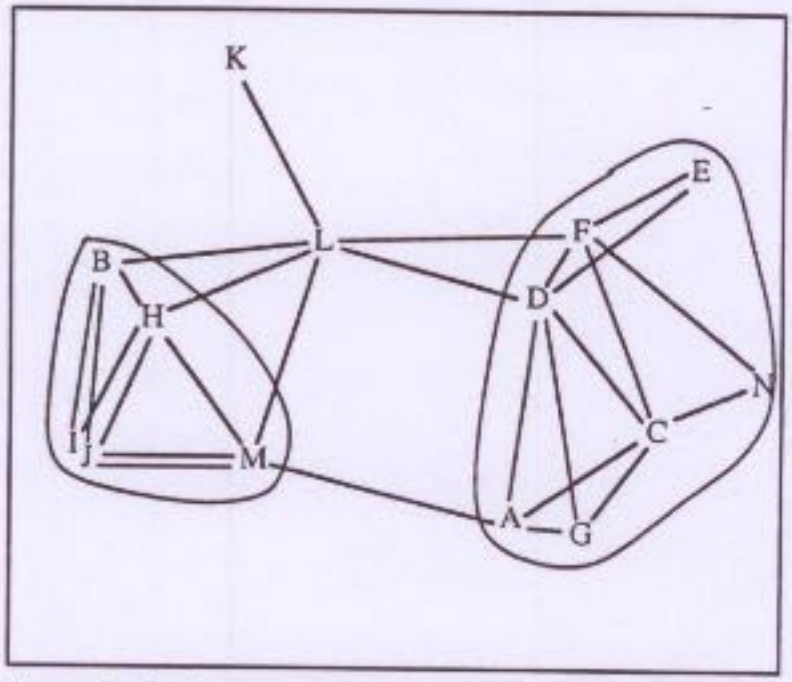

Figure 5. Sociogram overlaid on MDS representation of graph theoretic distance.

Laying the actual ties between actors over a representation of their graph theoretic distances makes it possible to see the data itself, and can therefore serve as an important guideline in interpreting the MDS representation accurately. If we consider the right group alliance A, and the left group (except points L and K) alliance B, both alliances have a greater density of ties than the structure as a whole. Eleven out of the 14 ties involving members of alliance A are to other members of that alliance, while these same figures are 8 ties out of 12 for alliance B. In addition, 11 out of 21 possible within alliance ties exist for alliance A, while 9 out of 10 possible within alliance ties exist for alliance B. The sociogram therefore further corroborates the existence of two distinct political camps (Doreian 1988).

In addition, the sociogram demonstrates more clearly the positions of points L (Former Council President) and K (Former Council Member). In Figure 4, the point K appears as peripheral to the graph as a whole, while the point L appears to occupy a central position. The sociogram confirms K's peripheral position by showing that it has only one tie, and that tie is not with a member of either camp. The sociogram also clearly demonstrates the central position of the Former Council President (L). Through L, five indirect ties exist between alliances A and B. These five ties are the only ones between the two alliances, except for that between A and M.

An MDS representation of paths between actors in a network is useful in achieving a comprehensive and accurate image of each actor's relative position in the network. However, an MDS plot frequently does not suggest easily discernable and unambiguous partitions between groups of actors. Here an overlaid sociogram of direct ties can often be useful. Yet decisions about how many subgroups a graph should be divided into and whether or not those subgroups are actually real still involve a subjective component on the part of the researcher. The best defenses against this problem are to theoretically substantiate the partitioning of a graph into particular subgroups, and to further analyze the data using additional methods.

Applying the Structural Equivalence Approach

A subgroup cohesion analysis of this network reveals the existence of two distinct political camps that share support only among themselves, while the Former Council President receives support from both camps. However, this network of political support can also be analyzed according to structural equivalence. Since influence can be communicated across ties of support, two actors who share similar ties to other actors in the group are likely to share similar political views. Specifically, structurally equivalent actors are more likely to agree upon the proposition for a new jail.

Referring back again to Figure 3, MDS can also be used to analyze a network according to structural equivalence. However, instead of submitting a path distance matrix to MDS, a similarity matrix describing the structural similarity of each pair of actors is submitted instead. The most frequently used method for calculating the similarity between two actors is to compute the standard product moment correlation between their respective columns in the raw data matrix. The correlation between these columns indicates the similarity of the shape of those actors' profiles of ties to other actors in the network, and is the most sensitive measure of structural similarity. Using standard network computer programs, this procedure can easily be performed on each pair of actors in a network, yielding a symmetric matrix of similarity scores. (A high positive correlation means that two persons are connected to almost all the same others; a low (or negative) correlation indicates the absence of similar third-party ties.) In contrast, euclidean distance can be used to measure similarities both in the shape of actors' profiles of ties and in the mean and variance of those ties. Because Euclidean distance takes into account shape, mean, and variance of actors' ties, it is a less sensitive measure of structural similarity than correlation. However, since the amount by which two binary profiles may differ in mean and variance is relatively small, the results of analyzing binary data using euclidean distance are typically not much different than those using correlation.

Note here how these methods of measuring structural (dis)similarities can be used to analyze two-population networks (where one population is represented by the rows, and the other by the columns). The correlation or euclidean distance can be calculated for columns or rows. In addition, similarities between actors may also be calculated using information about several different types of ties. For example, consider a hypothetical 14 x 14 matrix containing the friendship ties between the political actors in our example. By stacking this matrix on top of the political support matrix on page 23, each column would contain information about that individual's political support and friendship ties. This stacked matrix could then be used to calculate similarities between actors. The ability to analyze two-population matrices and multiple matrices simultaneously represents the real power of the structural equivalence approach.

Figure 6 below is a non-metric MDS representation of structural similarity scores (correlations) for the 14 political figures in our example:

This MDS representation of correlational similarity scores distinguishes between alliances A, B, and the unique actors L and K much more clearly than the MDS representation of the distance matrix in Figure 4. The relatively high densities within both alliances result in a high degree of structural similarity among the members of each, and an especially low similarity across alliance boundaries. Figure 6 further confirms the decision to separate the network into only two subgroups.

The other method for analyzing a network according to structural equivalence is by using CONCOR (CONvergence of iterated CORrelations). CONCOR is an algorithm that splits a network of actors into smaller groups based on their structural similarity. Unlike MDS on correlational similarity scores, CONCOR yields discrete groups or "blocks" of actors who are structurally equivalent, thereby relieving the researcher from having to make subjective decisions about identifying clique membership. However, the researcher also loses the fine-grained comparisons between actors which MDS allows.

CONCOR begins by calculating a correlational similarity matrix based on the correlations between each pair of columns. This similarity matrix is identical to that which was used above to produce Figure 6. However, CONCOR then performs the same operation again, this time using the similarity matrix itself. After repeating this step several times, the correlations between all pairs of actors converge to either -1 or 1, and the network can be

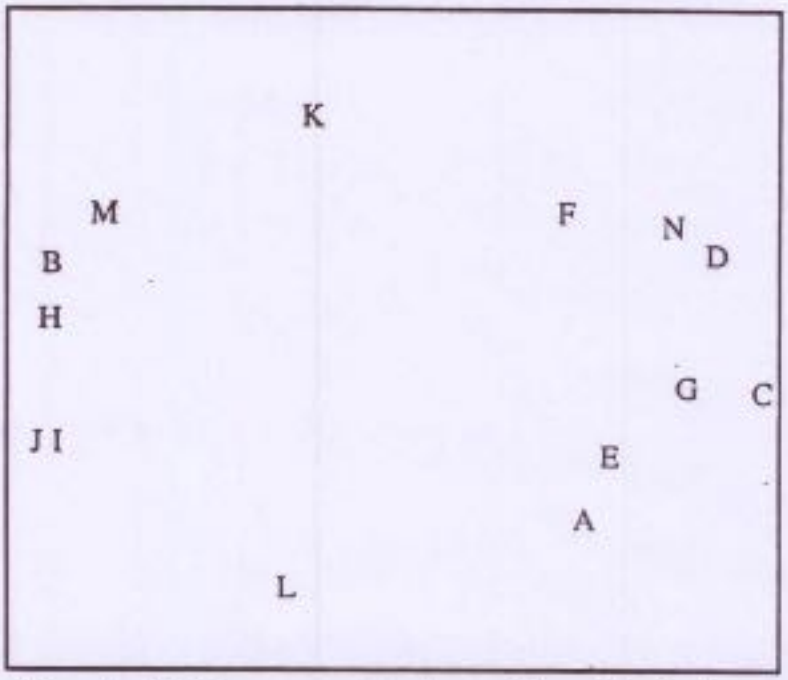

Figure 6. MDS representation of correlational similarity scores.

partitioned into two distinct groups. In effect, this is a method of relaxing the strict definition of structural equivalence just enough to partition the network into two subgroups. (As noted above, it is also possible to use CONCOR to simultaneously analyze several different relations over the same group of N actors. Multiple matrices representing the different relations are stacked to produce the first correlation matrix, and this matrix is then used for successive iterations.) This convergence of the correlations is a remarkable fact, one which we do not have space here to address. However, we encourage interested readers to further explore both the theoretical and technical aspects of the procedure. Discussion of these may be found in Breiger, Boorman, and Arabie (1975), Arabie, Boorman, and Leavitt (1978), and Sailer (1978).

The splitting procedure may be repeated again and again until the original network has been divided into groups containing only one actor. Similar to interpreting an MDS plot, the decision about how far to divide a network using CONCOR should be informed both by theory and by the results of alternative analyses. Figure 7 below shows CONCOR's first three partitions on the example data:

Although the first partition successfully distinguished between alliances A and B, subsequent partitions failed to distinguish K and L from alliance B. However, upon referring back to Figure 5, the reason is clear. Except for its ties to alliance A, L has exactly the same ties to members of alliance B as both I and J do. Therefore, L is more structurally equivalent to I and J than it is to any other nodes in the network. Because CONCOR forces partitions on the data, it may sometimes obscure important distinctions between nodes. However, it provides a standardized and less subjective way to partition whole networks into structurally equivalent subgroups.

The subgroups of actors generated by CONCOR may also be used to perform a type of analysis called blockmodeling. This technique is based on permuting the rows and columns of an adjacency matrix to reveal its underlying structure. For example, look back at the adjacency matrix on page 23. It is impossible to understand the structure of the network simply by looking at this matrix. However, if the rows and corresponding columns of this matrix are reordered (permuted) according to the subgroupings generated by CONCOR, the following matrix results:

			(1)				(2)			(3)				(4)		
			A	C	D	G	E	F	N	B	H	K	M	I	J	L
	Co. Executive	(A)	0	1	1	1	0	0	0	0	0	0	1	0	0	0
(1)	Sheriff	(C)	1	0	1	1	0	1	1	0	0	0	0	0	0	0
	Council 1	(D)	1	1	0	1	1	1	0	0	0	0	0	0	0	1
	Council 4	(G)	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Council 2	(E)	0	0	1	0	0	0	0	0	0	0	0	0	0	0
(2)	Council 3	(F)	0	1	1	0	1	0	1	0	0	0	0	0	0	1
	Co. Prosec.	(N)	0	1	0	0	0	1	0	0	0	0	0	0	0	0
	Co. Auditor	(B)	0	0	0	0	0	0	0	0	1	0	0	1	1	1
(3)	Co. President	(H)	0	0	0	0	0	0	0	1	0	0	1	1	1	1
	Form. Council	(K)	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	City Mayor	(M)	1	0	0	0	0	0	0	0	1	0	0	1	1	1
	Council 5	(I)	0	0	0	0	0	0	0	1	1	0	1	0	1	0
(4)	Council 6	(J)	0	0	0	0	0	0	0	1	1	0	1	1	0	0
	Form. Co. Pres.	(L)	0	0	1	0	0	1	0	1	1	1	1	0	0	0

This reordered matrix does have a visible pattern – namely a concentration of ties in the upper left and lower right corners. The subgroup membership of the individuals divides this matrix into sixteen smaller matrices or blocks, each of which contains all of the ties from one group to another. Blocks in which all of the possible ties occur are called pure one-blocks, and blocks with no ties are called pure zero-blocks. For example, there is a pure one-block from group 1 to itself (ignoring diagonal entries), and pure zero-blocks from group 2 to group 3 and from group 3 to group 2.

Although examining the permuted matrix is helpful, it too can be cumbersome, especially if it is large or if there are many blocks. Therefore, it is helpful to collapse this matrix down into a smaller one called an image in which each group is represented by only one row and column, and each block is represented by a single binary entry. If the permuted data matrix consists entirely of pure one-blocks and zero-blocks, this may be done with no loss of information. However with real data, this will almost never occur. The researcher is then left with two options. Because real networks are often sparse (relatively few of the total possible ties actually occur), pure zero-blocks are much more likely to occur than pure one-blocks. So, one solution is to represent pure zero-blocks with a zero, and all other blocks (those with one or more ties) with a one. This solution is useful for some situations;

however, the occurrence of random ties often yields several blocks with only a few ties in them. Depending on the situation, the researcher might wish to treat these blocks as zero-blocks. This may be accomplished by averaging the densities of all the blocks, and constructing an image in which blocks with below average density are represented as zero-blocks, and blocks with above average density are represented as one-blocks. Images of the example data constructed using both options are shown below:

1	1	1	1
1	1	0	1
1	0	1	1
1	1	1	1

no impure zero-blocks

1	1	0	0
1	1	0	0
0	0	1	1
0	0	1	1

cutoff-value is average density

These images provide a more concise view of the network structure than the permuted data matrix. The first, produced under the criterion of no impure zero-blocks, does not reveal the overall split into two cliques. However, it highlights the complete absence of ties between groups 2 and 3, which was missed by the other analyses. Although this fact does not seem to be directly relevant to vote choice for the new jail, it does suggest a reason why the division between the two political camps (one containing group 2, and the other containing group 3) persists. The second image produced using an average density cutoff, does produce the overall division into two cliques, both of which give support only to themselves. This image does not reveal the special positions of nodes K and L. Although blockmodel images can assist in interpreting underlying network structure, the researcher should always carefully examine the permuted data matrices to assess how accurate the images are.

Blockmodeling is especially helpful in three respects. First, inspecting a permuted data matrix makes it possible to move back and forth between the aggregate structure and the intimate details. The researcher can quickly scan a particular group's overall pattern of ties, and yet at the same time can identify which individuals pose exceptions to that general pattern. This level of specificity is lost in an MDS representation of the data. Second, in contrast to the path distance analysis, asymmetries in the data are apparent in the images and become a critical part of the analysis. Third, the same permutation can be applied to multiple matrices, each containing information about a unique type of tie between the same individuals. Comparing the images that result from these permuted matrices can reveal patterns in the way these different ties coexist. For a more formal and complete presentation of blockmodeling, see White, Boorman, and Breiger (1976), Boorman and White (1976), and Arabie, Boorman, and Levitt (1978).

This example demonstrates a surface level analysis of a well-known network dataset. More elaborate hypotheses could be constructed, and correspondingly more in-depth analyses could be performed (see Doreian [1988]). Although the interpretation of the analyses presented in this example were relatively straightforward, this is frequently not the case. Instead, these network methods often yield ambiguous results which the researcher must then pick apart in order to reach an informative conclusion. Nevertheless, these methods allow us to probe the underlying structure of social networks in a manner that has not until now been possible.

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A Case of Network Analysis: Western Electric's Hawthorne Works

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Authors' Note

This teaching case was prepared for use in an MBA course entitled "Managing Organizations Through Networks." Its purpose is to provide a condensed description of the well-known Bank Wiring Room, part of a larger study of worker productivity carried out between 1927 and 1932 at Western Electric's Hawthorne Works in Chicago. The paper is written in the style of a Harvard Business School "case" in order to provide a basis for class discussion. Details relating to the relationships between the men are emphasized, and the actual network data are reproduced so that students may perform their own analyses. All information and ideas contained herein are taken from F. J. Roethlisberger and William J. Dickson's Management and the Worker, Cambridge: Harvard University Press, 1939, and George C. Homans' The Human Group, NY: Harcourt, Brace, & Co, 1950.

As a Group Chief at Western Electric's Hawthorne Works, Jack Thompson is responsible for monitoring and reporting, to higher management, the output of a group of fourteen workers who wire, solder, and inspect banks of telephone terminals. In the past, Thompson has chosen not to closely monitor each employee, believing that such scrutiny would ruin his relationship with the group. Instead, he has relied on the employees themselves to report their daily accomplishments to him. Recently, however, Thompson has begun to suspect that several members of the group are not reporting their output accurately. Based on a series of checks initiated by the Plant Manager in which outside observers recorded the output of each worker throughout the workday, Thompson determined that some faster workers were reporting that they accomplished less each day than they actually had, while slower workers were overreporting their daily output. Some members of the group occasionally underreport on days when they get a lot done, thereby allowing themselves a cushion for those days on which they fall behind. Although the workers believe that their inaccurate reporting probably "averages out" in the end, Thompson is becoming increasingly concerned as he observes certain individuals consistently turning out much less output than they report, thereby doing significantly less work than the others.

The Hawthorne Works has been the site of several productivity studies over the past five years. Management has encouraged researchers, exploring new techniques for studying work environments, to gather data at Hawthorne so they might suggest ways for the plant to change working conditions to maximize comfort and efficiency. The ongoing presence of the researchers and the implicit intentions of the management have created tensions for supervisors such as Thompson. Thompson's decision to cultivate the relationship between himself and the workers in his group sacrifices his efficacy as a representative of management, but it is unclear what, if anything, should be done.

The Hawthorne Plant

The Western Electric company, a subsidiary of the American Telephone and Telegraph Company, manufactures telephones, central office equipment, and several types of cable for the Bell System. The company's Hawthorne Works is its largest plant, and is situated on the western edge of Chicago in Cicero, Illinois. Hawthorne employs 29,000 people of 60 different nationalities, although 75% of these are American born. A majority of those with strong ethnic backgrounds are Polish or Czechoslovakian, yet there are also Germans and Italians.

The plant is organized into eight separate branches called Accounting, Operating, Production, Inspection, Technical, Specialty Products, Public Relations, and Industrial Relations. Contrary to the terminology used by many industries, the Production Branch does not make products. Rather, it coordinates the necessary raw materials and technical apparatus so that they are sufficient to complete orders and meet delivery dates. It is within the Operating Branch, the largest of the eight branches, that raw materials are turned into finished products. The Inspection Branch monitors and controls the quality of these products. Highly specialized products and those of small demand are made within the Specialty Products Branch. The Technical Branch sets piece rates and maintains the plant and its machinery. The Industrial Relations Branch is responsible for maintaining good employee relations, and there-

fore works with all of the other branches. Distinct units within this branch administer company policies such as a stock participation plan, insurance plan, home loan opportunities, and pension and personal finance plans.

The Works Manager and the Assistant Works Manager are the highest officials at the Hawthorne Works, and maintain authority over all eight branches. Within each branch, there is a separate line of control beginning at the top with a Superintendent. Each branch is then divided into subbranches, each of which has its own Assistant Superintendent. General Foremen are in charge of divisions within each subbranch; Foremen are in charge of departments within divisions, often aided by Assistant Foremen; Section Chiefs are in charge of sections; and finally Group Chiefs are in charge of actual work groups which are the smallest units within the plant. The organizational structure of the plant is represented in Exhibit A.

The Bank Wiring Room

One section of the Operating Branch is responsible for assembling switches to be used in central office telephone equipment. Within this section, a group of fourteen men wire, solder, and inspect banks of terminals in a room called the Bank Wiring Room.

Of the fourteen workers or "operators," as they are called, two are inspectors, three are soldermen, and nine are wiremen. One solderman solders the connections wired by three wiremen. This makes for three distinct soldering units, each composed of one solderman and three wiremen. One unit produces terminals to be used in selectors, while the other two units produce terminals to be used in connectors (connectors and selectors are two different kinds of telephone switches). The two inspectors share the responsibility of inspecting the terminals produced by the three units.

The wiremen in the first soldering unit are Winowski, Mueller, and Taylor, and their solderman is Steinhardt. This unit wires connectors on the benches at the front of the room. Donovan, Capek, and Krupa wire for the second connector unit, and along with their solderman, Matchek, work on the benches directly behind the first unit. The selector unit works at the rear of the room, and is composed of wiremen Hasulak, Oberleitner, and Green. Cermak solders for this unit. The remaining two people in the room are the inspectors, Allen and Mazmanian. Although a trucker occasionally enters the room to drop off supplies or pick up completed equipments, he does not interact much with the other operators. Information about each operator's background characteristics and job performance is presented in Exhibit B.

The physical layout of the room is represented in Exhibit C. Each wireman works on two equipments at once, which are held in vices at positions A and B on the benches. Most of the wiremen have their two equipments side by side, while a few must move back and forth between two different benches. The two doors to the room are along the right wall, one at the front and one at the back. In the front of the room are a row of lockers, and along the left side of the room are four windows which open out onto a courtyard. The trucker loads and unloads in the extra space which is left in the front of the room.

The Work

A wireman begins by placing about ten banks in a holder on the table before him. Each bank consists of a convex piece of plastic, one and one half inches high and four inches long, with two-hundred metal points radiating outward. Using precut and prestripped pieces of wire, he connects the points in the banks following a specific pattern, wrapping the end of each wire around a point and then pulling it tight. When a wireman completes all of the necessary connections on one set of banks, he then begins work on a second set, during which time the solderman solders the connections on the first. Upon finishing the wiring of the second set of banks, the wireman then returns to the first set, places fiber insulators over the soldered connections, and then proceeds to wire another level of banks on top of the first. In this way, each wireman works on two "equipments" at once. After an equipment is completed, an inspector attaches it to a machine that buzzes if all of the connections are made properly. The inspector is also required to inspect visually all of the connections of each equipment, even those equipments that test properly.

These three tasks require different amounts of time to perform. Soldering is much faster than wiring, which allows one solderer to solder the connections made by three wiremen. Since solderers and inspectors can only work on equipments that the wiremen have completed, the wiremen essentially set the pace for the entire room. However, the solderers and inspectors can also limit the room's output by working more slowly.

According to the formal rules of the plant, each operator is supposed to do only his or her specific job. This position is defended on the grounds that by developing certain specialized skills each individual operator will become more efficient. Only if a wireman becomes completely fatigued is he allowed to temporarily trade jobs with

a solderer. Management defines fatigue for the wiremen as having such sore fingers that they cannot continue wiring, a condition the wiremen rarely encountered.

The job of the three selector wiremen differed only slightly from that of the other six connector wiremen. Connectors were often eleven banks long, while selectors were never more than ten. In addition, connectors weighed only about half as much as selectors did. Yet in reality, neither of these differences in the equipment translate into important differences in the work required to construct them. Each wireman is only required to lift two equipments per day; and even the selectors can easily be lifted by a man in decent shape.

Despite the similarity of the work required of connector and selector wiremen, the men consider wiring connectors to be the better job. New wiremen are usually started on selectors; as they become more proficient, they are then moved forward to connectors. Since increases in efficiency are usually also rewarded with increases in hourly rate, a man's position in the room reflects not only his efficiency but often also his earnings. However, the men look at "going on connectors" as a promotion even if it is not accompanied by a raise in hourly rate, and a few were upset when they were moved back to selectors even though they still received the same pay.

Compensation

The operators in the Bank Wiring Room are paid according to a system called "group piecework," in which the entire department is treated as a single productive unit. This payment plan consists of two steps. In the first step, each operator is paid according to a specific hourly wage. This wage, multiplied by the number of hours a man works during the week, is called the total "daywork value" of his work for that week. Hawthorne has pledged to always pay at least this amount to each operator, regardless of the total production of the group.

In the second step, the total "piece rate earnings" of the group are calculated for that week. This is done by adding the value of all of the completed equipments taken from the room by the trucker. The sum of the entire group's daywork values are then subtracted from the group's total piece rate earnings, almost always yielding an excess. This excess is then divided among the group proportional to each operator's hourly wage. Each operator's portion of the excess is called his "percentage." This percentage is added on to his daywork earnings to yield his final weekly pay. Increasing the hourly wages of all employees by amounts proportional to their existing hourly wages does not change the actual earnings of any of the operators – it only makes the excess smaller (except if the wages are increased by so much that the sum of the group's total daywork value exceeds the value of the completed equipments). However, increasing the hourly wages of only a few of the operators always decreases the amount paid to the others.

Each operator's hourly wage is determined largely by his demonstrated record of efficiency. The plant monitors each operator's efficiency using two pieces of information: the amount that the operator produces, and the time that he spends working. According to the formal guidelines of the plant, the Group Chief is responsible for collecting and verifying this information. Through these tasks he is intended to serve as an arm of management, keeping a close watch on the individual operators. For Thompson, however, this would be an impossible task. Since he is also in charge of other groups, he does not have the time necessary to count the connections made by each man, as well as to monitor the time each man spends working. In order to solve this problem, Thompson relies on each operator to report to him his daily accomplishments.

The wiremen in the room mentally keep track of how many connections they wire, and each informs Thompson of his total at the end of the day. An observer temporarily monitoring the room was impressed by the accuracy with which many of the wiremen remembered how many connections they had completed. He reported that several of the men were able to recall within a couple of connections the exact number that they had completed each day of that entire week. In addition, some of the men were even able to tell the time of day by how many connections they had already wired. Yet despite the wiremen's accurate estimates of how many connections they wire, many of them do not report these figures to Thompson. Instead, they consistently report a slightly higher or slightly lower number. A few consistently report numbers much higher than what they are actually turning out.

Although all but the most consistent wiremen have some daily variation in the amount of connections that they complete, they tend to report to Thompson a relatively equivalent amount every day. For most of the men, the faster days and slower days roughly cancel out so that Thompson's record of their weekly totals is quite close to what they have actually completed.

It is assumed that each wireman spends his entire shift wiring. However, because the pace at which a wireman works is occasionally constrained by factors beyond his control, Hawthorne allows the operators to report the lengths of time that they are delayed by such interruptions. In the Bank Wiring Room, the men report these delays to Thompson who has the formal authority to grant them "daywork allowances." These daywork allowances are then subtracted from the time the operator spends at the plant to yield a more accurate estimate of total time

worked. Final efficiency figures are calculated by dividing this revised estimate of total time worked into the total connections wired in that day. For example, a wireman might spend eight hours at work on a given day and complete 6,900 connections. Suppose that, of those eight hours, he spends one half hour waiting for his solderman, and one half hour waiting for more banks to be delivered to the room. In this case, 6,900 connections in seven hours would be counted toward the operator's efficiency. Because daywork allowances insure that individual operator's efficiency ratings are based solely on the time spent working on assigned tasks, they allow an operator to maintain a high efficiency rating and likewise a high hourly wage despite uncontrollable interruptions to his work.

There are several justifiable reasons for daywork allowance claims, which can be grouped into four categories: shortage of parts, defective materials, slowness of co-workers, and miscellaneous. Together, defective materials account for the fewest of the claims, while the other three account for many more. The slowness of co-workers category is further broken down into waiting for the trucker, waiting for a solderman, and waiting for an inspector. Since certain wiremen make more claims in this area, some soldermen and inspectors are being blamed for more delays than others. During a given period, Steinhardt was never cited, Matchek was cited only three times, and Cermak was cited 17 times. As for the inspectors, Allen was never cited, while Mazmanian was cited 54 times. Of the 76 total claims made during this period, 65 of them were made by the three slowest wiremen: Hasulak, Oberleitner, and Green.

The formal system of daywork allowances should be distinguished from the system of daywork credits also used by Hawthorne. The essential difference between the two is that while daywork allowances are used solely for the calculation of efficiencies, daywork credits are used largely for the purpose of payment. A small portion of each wireman's time is spent doing small preparatory and clean up tasks around the room, instead of working on equipments. However, since such work does not directly contribute to the completion of equipments, if those hours were paid on a piece rate basis they would lower the excess for the entire group. Therefore, these hours are paid on a straight daywork basis. A daywork credit simply represents an amount of time for which an operator is paid separately from his group piece rate earnings. For example, if on a given day a wireman spends seven hours wiring and one hour cleaning solder off the benches, he would simultaneously request both a daywork allowance of one hour and a daywork credit of one hour. Thus, he would be paid for eight hours, although only the seven hours he spent wiring would be applied in estimating his efficiency. Like daywork allowances, a wireman must request a daywork credit from Thompson.

It is Thompson's responsibility to accept or reject the claims for daywork allowances made by the men, but he feels that he is in an awkward position to do so. Because he is not in constant contact with the men, he believes that any decisions he would make about the validity of individual claims would appear arbitrary to the men. In addition, the plant provides no formal procedures for determining the validity of individual claims. For example, the wiremen often blame defective materials as the reason for not being able to work. When Thompson then demonstrates that the materials are satisfactory, the wireman in question will sometimes switch the blame to the slowness of his solderman. On the few occasions that Thompson has questioned the soldermen, they argued that the wiremen had structured the completion of their equipments in a way which prevented them from keeping up, and that the wiremen were simply attempting to shift the blame. Because some of these claims are honest ones, Thompson is afraid that if he attempts to discriminate between those that are and those that are not, he will seem arbitrary to the men, and they will begin to resent him or refuse to cooperate with him at all. Therefore, he accepts almost all of the claims for daywork allowances in an attempt to maintain good relations with the men.

Productivity in the Room

Management instituted the group piecework payment scheme with the intention of motivating the operators to work until they became fatigued. Since each operator can increase his own hourly rate by increasing his own efficiency, it was reasoned that he would try to do so. In addition, the percentage of the excess that went to each of the men would only appreciably increase if all of the men worked harder to produce more. Again, it was reasoned that this would create a situation in which the men would push each other to work as fast as possible. In reality, however, none of the men complain of fatigue to Thompson, nor do they refer to it in their conversations.

Despite the intentions of the management, the men do not work to increase their output but instead strive to keep their output at a constant rate, a behavior referred to by the managers as a "straight line" scheme of output. The operators believe that their individual output should remain constant from day to day, and if it doesn't they report either more or less than they actually have completed. Some of the men fear that if they were to turn out an unusually high number one day, management would view this high number as what they were actually capable of and impose it as a new standard. Also, the men claim that if they produced an unusually small number one day, the supervisors would use that as an excuse to "ball them out."

Many of the men express the fear that if they produce significantly more than two equipments per day, "something bad will happen." For example, Taylor noticed that "since the layoff started there's been a few fellows down there who have been turning out around 7,300 a day. They've been working like hell. I think it is foolishness to do it because I don't think it will do them any good, and it is likely to do the rest of us a lot of harm." He then went on to explain, "you see if they start turning out around 7,300 a day over a period of weeks and if three of them do it, then they can lay one of the men off, because three men working at that speed can do as much as four men working at the present rate." Krupa, alternatively, believes that working harder will cause the management to lower their hourly rate. Others, particularly Donovan, believe that the management will expect more from them, and raise the "bogey" (see below). All of the men are concerned about the detrimental effects of working harder, and many are convinced that such effects are likely. In fact, the foreman of the department is very proud of "his boys," as he calls them, and feels that if they were to work any harder, they would surely tire themselves out.

Since the group piecework payment scheme imposes no particular standard on the operators as to how quickly they are expected to work, Hawthorne has established a formal guideline called a "bogey." This is presented to the operators as the amount of work which each of them should be able to accomplish in one hour. For wiremen, the official bogey is 914 connections per hour, or about 7,300 connections per day.

Although the wiremen know that a formal "bogey" exists and refer to it in their conversations, few of them can say accurately what the number is. Winowski believes that 6,600 connections is the bogey. He says "You see, that's two sets. There are 3,300 connections on a set. Now on selector wiring, the bogey is only 6,000, because there are only 3,000 on a set." Winowski also said that "they told us if we got out two sets a day it would be all right. That's a pretty good day's work too."

Many of the wiremen know that they turn out a little less than the official bogey, but believe that to be all right. Taylor turns out 6,600 regularly, because he says "That's what's expected of us." However, he knows that the bogey is 914 per hour and thinks that it probably works out to a bit more than 6,600. Capek thinks that the bogey is around 7,200, but claims that he works at 100% efficiency all day in order to turn out 6,600. According to Krupa, "the bogey is pretty high." However, he admits that he turns out 6,600 a day, and feels that to do so right along is "pretty good, for the average." Of the selector wiremen, Hasulak is certain that "6,000 a day is the rate." He guesses that there's another rate that's higher than that, but says that "the bosses tell us that 6,000 is a day's work." Finally, Oberleitner agrees that although the bogey is 6,600, "on selectors [we] don't have to turn out as many."

Almost all of the wiremen aim to complete the equivalent of two equipments per day. Despite this, they hardly ever finish the equipment they are working on at the end of the day. This means that when they arrive in the morning they must first complete the equipment they were working on the previous day before beginning a new one.

Some of the workers complain that it is unfair for some to work slowly while others work so much faster. Thompson agrees, and occasionally makes this clear to the slow wireman in question. For example, much of the concern expressed about slow wiring is directed toward Green, the slowest wireman in the group. One day, Thompson caught Green taking a break and asked him, "What are you sitting there for? Why don't you get to work?" Green began to make an excuse about having to wait for an inspector, but Thompson fired back "You're too doggone lazy for any use. . .You make me tired just looking at you." Although both Thompson and the section chief occasionally reprimand the slower wiremen, they also urge on the faster wiremen, suggesting that they could be turning out even more than they already are.

Relations Among the Men

Although wiring, soldering, and inspecting all demand concentration, the men in the Bank Wiring Room interact frequently among themselves. Most of these interactions consist of conversations that arise during the normal course of working. The men share gripes about management, the quality of their materials, and coworkers. Much of what is said is directed toward specific others, yet the wiring room is small enough that when a man raises his voice many of the men are able to hear him. Occasionally, conversations provoke extended discussions about issues such as ethnicity or religion. Several of the men participate in these discussions.

Five different types of relationships between the men are represented in Exhibit D: friendships, antagonisms, arguing over windows, playing games, and helping.

Some of the men have one or two especially close friends in the room, in addition to others with whom they are friendly. A couple men are friendly with almost everyone in the group, without having any especially strong friendships. Still others are somewhat isolated from the entire group. Those who are friendly with each other get together outside of their jobs. They play sports after work, and entertain each other in their homes. At work, one

man might help another out if he gets behind, by wiring connections on his equipment for him. The men also engage in games during lunch and breaks, such as pooling bets on horses and "lagging coins" or "matching nickels."

Not all of the interactions that occur in the room are friendly. In fact, many are openly hostile. Arguments over opening or closing the windows occasionally erupt into near physical altercations, which are usually averted at the last moment by another man jumping in. Other heated conversations center on an individual's nationality, or the speed at which he works. Occasionally, a new man will work so quickly that he consistently exceeds two equipments. In this case, the other men tease him in various ways. One way is verbally, chiefly through name-calling. Another way is through physical punishment, usually in the form of a game called "binging." Under the rules of this game, one man goes up to a second and hits him in the arm as hard as he can. The second man is then allowed to do the same thing to the first. The object is to be the one who hits the hardest. However, if a man is "binged" by another stronger than himself, he cannot retaliate equally. For this reason, the game is often not friendly but is instead used as a form of control, in which the stronger men "bing" weaker ones. The wiremen in the back of the room engage in "binging" more frequently than the others do.

Most of the criticism between wiremen over their performance is aimed at slowing down the faster workers, but Capek often criticizes wiremen who don't work as hard as he does. He works steadily and accurately, although this does not show on his face.Instead, he appears comfortable and relaxed as he works. Once he establishes a rhythm, he is annoyed by anything that disturbs that rhythm, especially poor quality wire or a shortage of available banks. At the end of the day, he sometimes fastens single wires here and there on the next two or three levels of the equipment he is working on. As a result, none of the other wiremen or soldermen can do anything to that equipment, and as soon as Capek comes in the next morning he can connect the few remaining wires and already have two or three levels completed. This method of wiring requires more skill than wiring each point in sequence, because the wireman must understand the pattern of connections well enough to know where to place the remaining wires. A few of the other wiremen occasionally use this trick also.

Donovan admires Taylor's work, and thinks that Steinhardt is the best solderman in the room. However, he doesn't like Capek at all. In fact, he says that "It wouldn't make any difference to me if he were dead or alive." Donovan claims that his antagonism toward Capek is largely due to Capek's never offering to help him, even though he once helped Capek. He never asks Capek for help directly, but instead feels that Capek should volunteer his assistance like Mueller and Taylor do.

Donovan tells people that the wiremen who wire at his end of the room are superior to the ones who wire at the other end. "We have sort of got together," he says. "We're a group all by ourselves. It seems like we are apart from the department now. We're really two groups down here, the group in front and the group in back." Donovan includes himself, Winowski, Mueller, Taylor, Steinhardt, and Allen as members of the "group in front." The "group in back," he says, consists of Krupa, Hasulak, Oberleitner, Green, and Cermak.

Donovan describes the discussions among men in the front group as being "of some importance." "Gee, how we argue," he says. "Everyone gets in on it too." However, Donovan doesn't really know what those in back talk about, because he doesn't talk to them very much. He says that they "mostly horse around so. You see, there are Hasulak, Oberleitner, and Green. They are the slowest wiremen in [the room]. Not only in [the room], but in the whole department. The rest of us up in front turn out all the way from 6,000 to 7,000, and those fellows never get up to 6,000."

Although wiremen such as Winowski, Mueller, and Taylor rarely argue about the windows, Donovan does so frequently, usually with Capek and Krupa. These two refuse to close their windows, no matter how cold it gets. Donovan calls Krupa a "slave" because he "turns out so much." He even squealed once on Capek for changing the order of equipments lying on the truck so that he would have to wire the more difficult equipment. Donovan would never have squealed on anyone else. Sometimes when Donovan is arguing about the windows, Taylor kids him about it, as though to say "If you're in our group, you shouldn't do that."

Green, a selector wireman in the back of the room, works very slowly and is easily distracted. However, he does work fairly consistently throughout the day. He often complains of being tired, yet he always participates in strenuous sports after the day's work. He admits that he is not very interested in wiring, and that he could do a better job if he tried to. He accepts well the frequent criticism that almost everyone in the room directs toward him. For example, Krupa once complained to the group because he thought that Green had the same hourly rate as himself. He turned to Green and said "I'd just like to see what would happen to you if they should ever make this [room] a group by ourselves. I'll bet you would work. Just like I said the other day, we'd make you work." Despite Green's poor job performance, he has an agreeable personality and only Capek truly dislikes him. In fact, some of the men occasionally help him out. He purchases candy with Hasulak, Oberleitner, and Cermak, and talks with them frequently.

The men in the room call Hasulak "Jumbo" because he is so tall that he has to stoop uncomfortably over his bench in order to wire his connections. He works slowly, and welcomes any disruption to his work. Hasulak is especially friendly with Steinhardt. The two eat lunch together, as well as go out to dances and drinking parties. Hasulak is also especially friendly toward Green. A good example is his willingness to allow Green to close his window even though he refuses that favor to others. Hasulak does not get along well with Capek or Krupa, and has very little contact with the wiremen in the front of the room. His attitude toward Poles is very negative, as can be seen from this statement which he made one day: "I think most of them would turn out more work if they were on straight piecework . . . Of course, some of them Poles don't mind. They keep right on chewing their tobacco and spitting all over the floor and trailing their wire through it. I think it sort of numbs their minds so they can work without thinking of anything else."

Krupa, a connector wireman who works near the back of the room, is of Polish descent, and is often teased by the other men on the basis of his nationality and his small size. He is so short that he has trouble placing the wires when an equipment gets to be over three banks high. This problem has earned him several nicknames, such as "Shorty," "The Shrimp," and "The Runt."

Despite his small size, Krupa works very quickly, often helping others or getting into trouble once he has completed his own work. For this, some of the men call him the "Speed King." One day Oberleitner said to him, "Why don't you quit work? Let's see, this is your thirty-fifth row today. What are you going to do with them all?" Krupa replied "What do you care? It's to your advantage if I work, isn't it?" "Yeah, but the way your working, you'll get stuck with them," Oberleitner retorted. "Don't worry about that," said Krupa. "I'll take care of it. You're getting paid by the sets I turn out. That's all you should worry about." Oberleitner fired back, "If you don't quit work, I'll bing you." Oberleitner struck Krupa, and chased him across the room. Krupa did not go back to work at his own bench, but instead went to help another wireman.

Krupa considers himself part of the group in back. He talks in a friendly manner to everyone, and although he was not specifically disliked by any of the men, he annoyed many of them and they teased him in return. One time Hasulak, Oberleitner, and Green all ordered candy from the Hawthorne store. They asked Krupa to contribute toward the price, and he did. However, when the candy came, the three refused to give any to Krupa.

Krupa often tries to tell others what to do. He frequently argues with Thompson or the section chief over the quality of wire delivered to the room. He also attempts to argue the cases of men who are being reprimanded by Thompson. This backfires though, as Krupa often incites Thompson, making things worse for the wireman being "called up." As a result, Krupa is not really accepted by either group.

Mueller is not very talkative and avoids interacting with the others, except for being somewhat friendly toward Taylor and Steinhardt. Mueller wires very fast, a talent which has earned him the derogatory nicknames "Cyclone" and "Phar Lap," the name of a horse frequently bet on by the men in the room. As soon as he has finished a new row of banks, Mueller demands that Steinhardt immediately solder them and Allen inspect them. This behavior occasionally angers Steinhardt and Allen. Although Mueller was not very friendly, he did occasionally participate in games such as "lagging coins" or "matching nickles" with the others in the front of the room.

Oberleitner frequently complains of feeling poorly because he had been out late drinking the night before. He enjoys telling the group about his escapades with women, and his boxing ability.Although he is friendly with Hasulak, Green, and Cermak, he interacts almost never with the other operators in the room. The only exception is Krupa, whom he teases and argues over the windows with a great deal. However, their relationship is not unfriendly, in that they occasionally help each other.

Taylor wires connectors in the front of the room along with Winowski and Mueller. He is liked by everyone in the room, even the three selector wiremen, although he has relatively little contact with them at work. He invited Winowski, Donovan, and Steinhardt, his three closest friends, to his wedding. He always contributes to the various betting pools organized by the men, and has extended a standing invitation to everyone in the room to play poker at his house. These poker games are attended most regularly by Winowski, Donovan, and Steinhardt, and less often by Krupa, Oberleitner, and Green.

Taylor works very consistently, only easing up once he has finished his quota for the day. In fact, Steinhardt claims that Taylor's connections are better than those of any of the other wiremen he has soldered for. Despite his skill, Taylor was also helped more than any other wireman in the room. In fact, every connector wiremen has helped him at one time or another. Once, while Taylor was completing an interview required by the plant, Winowski, Donovan, and Krupa together wired ten levels for him. Since the plant was paying him his usual hourly rate during the interview, he did not need the ten banks. However, Winowski, Donovan, and Krupa let him count them as his own.

The other men allow Taylor to tell them what to do, which he does frequently. Not only does he win arguments with the men, but he also advises them on some of their personal problems. For example, when Steinhardt

Davis, Gerald F. 1991. Agents without principles? The spread of the poison pill through the intercorporate network. Administrative Science Quarterly 36(4):583-613.

This study compares the agency theory of the firm with the interorganizational theory in examining the factors associated with the adoption of the poison pill—a takeover defense issued by a firm's board of directors that can dramatically increase the cost that a hostile buyer would have to pay to acquire the firm—by a panel of Fortune 500 firms between July 1984 and August 1989. The pill's rapid spread is traced to a combination of ownership structure and other firm-level factors and an interlock network diffusion process. The results support a social structural perspective on the market for corporate control in which the interlock network provides a social context favoring continued managerial dominance. The findings are also more consistent with models of cohesion rather than structural equivalence as the social structural mechanism responsible for diffusion.

DeNora, Tia. 1991. Musical patronage and social change in Beethoven's Vienna. AJS 97(2):310-346.

This article attempts to account for the initial phase of the emergence of serious music ideology in late 18th-and early 19th-century Vienna by examining elite receptivity to the new ideology as it occurred against a backdrop of change in the organizational basis of music sponsorship. The decline of the private house ensembles (Hauskapellen) resulted in a social broadening of music patronage and thereby tended to erode the traditional institutional means for aristocratic authority in musical affairs. The exclusive function that the qualitatively different ideology of "serious" music could provide reaffirmed traditional cultural boundaries through ideological rather than institutional means and enabled Vienna's old aristocrats to emerge after 1800 as the city's "most brilliant" dilettantes.

Dhada, Mustafah. 1991. Post-Perestroika Africa: changing relationships with the outside world. Africa Today 38(3):5-6.

Here Dhada introduces three articles appearing in Africa Today: Daniel Kempton discusses perestroika in the Soviet Union and the new challenges it is creating for Africa; William Nester "explores the impact of Japanese neo-mercantilism" and the reemergence of Japan in the world economy, and; Odile Cazenave examines the impact of Western values on African individuals. Dhada also discusses relationships that Africa has had with the outside world, particularly the impacts of Islam, Christianity, European imperialism and capitalism, Marxism, and the emergence of the Soviet Union and Japan as global actors in the world scene.

Dorrell, Beth. 1990. Being there: a support network of lesbian women. Journal of Homosexuality 20(3-4):89-98.

This article describes the relationship of the author to a circle of young lesbian women who provided support and friendship to a terminally ill, elderly lesbian woman. The woman, referred to as Benton, began to form a support network around herself when, in 1984, her eyesight began to deteriorate. She was later diagnosed with lung cancer and eventually died of the disease. Benton's seven supporters had been referred to her through the Gay and Lesbian Outreach to the Elderly (GLOE). As support and services for Benton increased, she began to feel more confident, less isolated, and more in control of her own situation. The members of Benton's support network were also affected, claiming that: "[their] attitudes toward older women were changing as a result of knowing her.

Doverspike, R. D. 1991 Algorithms for multiplex bundling in a telecommunications network. Operations Research 39(6):925-944.

The function of a digital telecommunications network is to transport demand of digital signals between pairs of locations. To achieve this economically, multiplex equipment packs lower rate digital signals into higher rate signals for routing over transmission facility links. Given a multiperiod demand forecast and demand routing plan, the multiplex bundling problem minimizes equipment and transmission costs by demultiplexing the higher rate signals into their lower rate components at various nodes along paths to allow lower rate signals from different sources and sinks to be combined. However, exact solution of the multiplex bundling problem is intractable, and therefore this paper presents a heuristic two-phased approach. Phase 1 formulates a single-period, capacitated routing model. The Phase 1 solution method is to first solve a problem with relaxed capacity constraints and solve a 0-1 multiconstraint knapsack problem to obtain feasibility. Computational results show that the Phase 1 heuristic produces near-optimal results. Phase 2 exactly solves a multiperiod problem for each demand re-routing chosen in Phase 1 by using a single-stage dynamic programming algorithm. The Phase 2 algorithm reduces the state space by taking advantage of state conditions at optimality.

Dressler, William W. 1991. Social support, lifestyle incongruity...Psychosomatic Medicine 53(6):609-620.

Social support is generally thought to modify or "buffer" the impact of stressful events and circumstances on health. There has been little exploration of how the definition and effect of support is modified by culture. In this paper, the role of social support in moderating the effect of a social stressor on arterial blood pressure is examined in a southern black community. Traditionally, support was available mainly within the extended family in African-

American culture, In the aftermath of social change, however, younger black people often find their experiences to be more consonant with their peers. It was hypothesized that kin support would moderate the effect of status incongruence on blood pressure for older persons, while nonkin support would moderate the effect for younger persons. This hypothesis was confirmed in a community study. Future research on social support, therefore, must take into account cultural factors influencing the meaning of social support from different sources.

Dubini, Paola, and Howard Aldrich. 1991. Personal and extended networks are central to the entrepreneurial process. Journal of Business Venturing 237(2):305-314.

The authors propose a way of generating networking strategies for entrepreneurs by introducing general network concepts and discussing "the aggregation of personal networks into extended networks." They distinguish between personal and extended networks, describing personal networks as being focused on individuals, and extended networks as being collective. Dubini and Aldrich formulate two hypotheses concerning networks and entrepreneurial effectiveness. First, "effective entrepreneurs are more likely than others to systematically plan and monitor network activities" and second, they are "more likely than others to undertake actions towards increasing their network density and diversity."

Duck, Steve, Deborah J. Rutt, Margaret Hoy Hurst, and Heather Strejc. 1991. Some evident truths about conversations in everyday relationships: All communications are not created equal. Human Communication Research. 18(2):228-267.

This article presents a program of studies that map out daily conversations and so establish a geography of everyday communication. A new method (the Iowa Communication Record) is offered to extend research using diary methods and focus the researcher on communication in daily life. Three studies collectively show (a) consistent sex differences in the quality and nature of conversations across different types of relationships, (b) a consistent rank ordering of relationship types that differs from that intuitively included in previous models of relationship formation, and (c) a consistent difference between conversations held on different days of the week, with Wednesdays associated with greater degrees of conflictive communication. Self-disclosure is much less frequent in everyday life than assumed on the basis of laboratory work, and the predominant form of communication in intimate relationships is not only nonintimate but not simply distinguishable from communication in other relationship types. Communication quality distinguishes female from male partners, suggesting that previous findings on preference for female partners are truly founded in communication variables, which have previously been underrated. The article shows that closer attention must in future be paid to communicative variations created by daily events and circumstances, and the role of routine communication in daily life must be explored in future studies of social participation.

Eggert, Leona L., and Jerald R. Herting. 1991. Preventing teenage drug abuse: exploratory effects of network social support. Youth and Society 22(4):484-524.

Eggert and Herting were challenged by the need to help drug-abusing youths escape and change their destructive behavioral pattern. They (1984) had "implemented a school-based drug abuse prevention model based on a social network support perspective." Results indicated that the model's participants improved while their non-participatory peers worsened. The authors found it necessary to "evaluate the underlying theoretical social support model in the present study." They indicate their current aim to be a focus on the process of preventing high-risk youth from becoming drug abusers and an exploration of the effects of network social support.

Engstrom, Ingemar. Parental distress and social interaction in families with children with inflammatory bowel disease. Journal of the American Academy of Child and Adolescent Psychiatry. 30(6):904-912.

Twenty families who had children with inflammatory bowel disease (IBD) and 20 comparison families with healthy children were studied concerning parental distress and social interaction. The mothers in the IBD group scored very high on parental distress, whereas the fathers did not differ from the comparison group. Both parents in the IBD group reported significantly lower scores on a social support scale. The dimension of social integration was normal, but deeper relations and attachment were negatively affected among parents in the IBD group. The mental health of the children with IBD correlated with the social support, especially the qualitative aspects.

Erickson, Bonnie H. 1991. What is good taste good for? Canadian Review of Sociology and Anthropology 28(2):255-278

Bourdieu argues that cultural capital is useful in gaining higher class location, especially in some sectors, and is essentially a singe thing: high status culture. But his argument, developed for central France, is less useful for more subdivided Canada. This paper explores Bourdieu's ideas through a quota sample of 40 Torontonians. Results suggest that high status cultural capital does exist in Toronto, but has little part in class relationships at work, where the true cultural capital is command of the business culture which dominates private enterprises.

Business culture is also class stratified, and may play a role in class reproduction which is quite similar to that which Bourdieu asserts for high status culture.

Felce, David, Alan C. Repp, Mair Thomas, Alastair Ager, and Roger Blunden. 1991. The relationship of staff:client ratios, interactions, and residential placement. Research in Developmental Disabilities 12(3):315-331.

The behavior of staff and persons with severe handicaps was surveyed in nine settings, including four traditional institutions, three large community-based units, and two groups of small homes. Data were collected that established the relationship among staff:client interactions, client responding, and the size of staff:client groups. The latter showed that the institutions were characterized by larger client and staff groups than the large community units. Large client and staff groups were virtually absent in the small homes. Two general conclusions could be drawn about the relationship between staff-client ratios and client behavior: (a) when one or two staff were together, improvements in the level of the staff interactions and client adaptive functioning occurred as the client group decreased in size and the staff size remained constant; (b) improvement in staff performance and client behavior arising from the addition of staff to a client group of a given size was marginal or nonexistent. The results were discussed in terms of their implications for the design of residential environments.

Feld, Scott L. 1991. Why your friends have more friends than you do. AJS 96(6):1464-77.

It is reasonable to suppose that individuals use the number of friends that their friends have as one basis for determining whether they, themselves, have an adequate number of friends. This article shows that, if individuals compare themselves with their friends, it is likely that most of them will feel relatively inadequate. Data on friendship drawn from James Coleman's (1961) classic study "The Adolescent Society" are used to illustrate the phenomena that most people have fewer friends than their friends have. The logic underlying the phenomena is mathematically explored, showing that the mean number of friends of friends is always greater than the mean number of friends of individuals. Further analysis shows that the proportion of individuals who have fewer friends than the mean number of friends their own friends have is affected by the exact arrangement of friendships in a social network. This disproportionate experiencing of friends with many friends is related to a set of abstractly similar "class size paradoxes" that includes such diverse phenomena as the tendencies for college students to experience the mean class size as larger than it actually is and for people to experience beaches and parks as more crowded than they usually are.

Felmlee, Diane, Susan Sprecher, and Edward Bassin 1990. The disillusion of intimate relationships: a hazard model. Social Psychology Quarterly 53(1):13-30.

We conducted a longitudinal investigation to advance our understanding determinants of the breakups of premarital relationships. We considered causes, derived from several major theories, that were located in a variety of sources - in the relationships, in the social network environment, and in the individual. We extended previous longitudinal research methodologically by analyzing the data with hazard analysis, in which the dependent variable is the instantaneous rate at which the relationship terminates. In the analyses we examined how measures of different factors affected the rate at which a relationship changed from intact to broken up. We found that several variables were significant predictors of the rate at which relationships terminated, including comparison level for alternatives, amount of time spent together, dissimilarity in race, support from partner's social network, and duration of the relationship. These findings offer evidence suggesting that variables derived from social exchange, similarity, and social network theories all contribute toward an explanation of premarital breakups.

Finn, Jerry. 1991. Computer networking in the human services: an exploration of CUSSnet bulletin boards. Social Work Research and Abstracts 27(4): 1-34.

This study reports on a survey of CUSSnet (Computer Users in Social Services Network) electronic bulletin boards to acquaint the larger human services community with the emerging use of telecomputing technology and to identify the current use, funding, services, problems, and future directions of CUSSnet. Six of 14 CUSSnet boards nationwide have ceased operation primarily because of lack of institutional support. Services and stability of the remaining boards are described; suggestions for maintaining and improving current and future boards are explained.

Fisek, M. Hamit. 1991. Complex task structures and power and prestige orders. Advances in Group Processes 8:115-134.

This paper presents an extension of the theory of status characteristics and expectation states to group situations where the group task involves more than one instrumental ability. It is demonstrated that a novel way of conceptualizing tasks as having different types of structures naturally falls out of the theory. This conceptualization makes it possible to relate the power and prestige order of the group to the nature of the group task. Six theorems

specifying the dependence of the power and prestige order on the task structure are derived from the theory. The implications of these results for theoretical and applied research are indicated.

Forrest, David V. 1991. Mental, neuropsychic, and brain patterns of defense: neuropsychic defense continua from psychopathology to the particularly human parallel networks that are problematic for artificial intelligence. Journal of The American Academy of Psychoanalysis 19(1):99-123.

The synthesis of psychodynamic and neuroscientific data may be advanced by the study of similarly configured specific patterns of defense among continua from the normal and neurotic mental mechanisms of defenses, through what might be termed neuropsychiatric defenses influenced by the neurological state, to the more clearly neurological cortical reactions. These similar patterns and continua are the particularly human way brain adds its flavor of organism to mind, and the way in which all the psychodynamic mechanisms are specifically imbedded in the brain. A purely psychological psychodynamics lacking this medical perspective fails to model human mental processes and reflects problems with artificial intelligence models that do not model brain. The pathological reactions that we address in psychiatry and neuropsychiatry interfere with and thereby reveal parallel processing features in (1) analogical and metaphorical thinking; (2) reduplication, redundancy, and repetitiveness; (3) self, person, and environmental recognition, including transference processes; (4) approximation and statistical inference; (5) spatiality and motor control; (6) affectivity, perception of sensations and sexuality; (7) projective mechanisms; and (8) problem solving by optimization, vectorial summation, and the mutual interaction of interconnected agencies. The new concepts in artificial intelligence build upon brainlike structures called neural nets portend great economies, emergent natural features that are more like human processes, and hierarchical and cyclic organizational demands. Medical psychoanalysts who comprehend dynamic and brain mechanisms and can describe them in terms that refer to both domains and their interaction should find increasing theoretical and practical convergence of their work with the emerging study and modeling of these processes by new forms of computers.

Freeman, Linton C., Stephen P. Borgatti, and Douglas R. White. 1991. Centrality in valued graphs: a measure of betweenness based on network flow. Social Networks 13:141-145.

A new measure of centrality, CF, is introduced. It is based on the concept of network flows. While conceptually similar to Freeman's original measure, CB, the new measure differs from the original in two important ways. First, CF is defined for both valued and non-valued graphs. This makes CF applicable to a wider variety of network datasets. Second, the computation of CF is not based on geodesic paths as is CB but on all the independent paths between all pairs of points in the network.

Freeman, Walter J. 1991. The physiology of perception. Scientific American 264(2):78-85.

This article is the result of over thirty years of research by Freeman on the physiology of perception. He answers the question: "How does [instant] recognition, which psychologists call preattentive perception, happen so accurately and quickly, even when the stimuli are complex and the context in which they arise varies?"

Friedkin, Noah E. 1991. Theoretical foundations for centrality measures. AJS 96(6):1478-1504.

Three measures of actors' network centrality are derived from an elementary process model of social influence. The measures are closely related to, and cast new light on, widely used measures of actors' centrality ; for example, the essential social organization of status that has been assumed by Hubbell, Bonacich, Coleman, and Burt appears as a deducible outcome of this social network process. Unlike previous measures, which have been viewed as competing alternatives, the present measures are complementary and, in their juxtaposition, provide for a rich description of social structure. The complementarity indicates a degree of theoretical unification in the work on network centrality that was heretofore unsuspected.

Fulk, Janet, and Brian Boyd. 1991. Emerging theories of communication in organizations. Journal of Management. 17(2):407-446.

This article reviews recent theoretical developments in four areas of organizational communication that have a common concern with information processing: communication media choice, computer-supported group decision making, communication technology and organizational design, and communication networks. For each topic the article includes a review of current theory, an assessment of the empirical evidence to date, and proposals for further theoretical and empirical development. The wealth of scholarship in these areas in the last 5 years testifies well to the substantial contribution of information processing-related theories to a new core of organizational communication theory.

Fung, K.K. 1991. One good turn deserves another: exchange of favors within organizations. Social Science Quarterly. 72(3):443-463.

Because of information costs, accountability rules governing utilization of organizational resources are generally incomplete. This paper analyzes how these resources under incomplete accountability are captured through exchange of favors within organizations. Using game theory, it also explains why more of these resources are not being captured by vertical favor exchanges between the employer and employees and how horizontal favor exchanges among employees may be redirected to enhance economic efficiency.

Galaskiewicz, Joseph. 1991. Estimating point centrality using different network sampling techniques. Social Networks 13:347-386.

The paper outlines the methodological choices that analysts must make when sampling social networks and assesses the impact of different sampling techniques on the estimation of network parameters. Using data from Galaskiewicz's (1919) study of Towertown and River City, the results show the extent to which sampling percentage, the number of trials/estimates, sampling procedure, and network size and density affect the ability of researchers to estimate the point centrality of organizations in networks of information and money transactions.

Gallopin, G. C. 1991. Human dimensions of global change: linking the global and the local processes. International Social Science Journal. 43(4):707-718.

This article is an attempt to discuss, mostly from a methodological viewpoint, the problems associated with the interactions between global and local scales in the context of global environmental change. For the purposes of the present discussion, the concept of socio-economical systems will be extensively used.

Gander, Anita Moore, and Lou Ann B. Jorgensen. 1990. Postdivorce adjustment: social supports among older divorced persons. Journal of Divorce 13(4):37-52.

This study reports identified factors in the social support network that predict postdivorce adjustment of persons married fifteen years or more. One hundred eleven respondents with a mean age of 56 were evaluated using the General Well-Being Scale (GWB) (Fazio, 1977) and the Social Adjustment Scale of Self-Report (SAS-SR) (Weissman & Paykel, 1974). Using the GWB, the best predictors of well-being were frequency of help sought from friends, closeness with children, gender, and size of emergency network. Using the SAS-SR, the best predictors of postdivorce adjustment were, again, closeness with children, satisfaction with friends, and relationship with as well as frequency of contact with former spouse's kin. Implications for direct practice and social policy interventions involve strengthening both the parent/adult-child relationships and relationships with friends. Interventions include the development of emergency networks.

Gillespie, David F., and Susan A. Murty. 1991. Setting boundaries for research on organizational capacity to evacuate. International Journal of Mass Emergencies and Disasters 9(2):201-218.

A theoretical model of factors contributing to evacuation capacity is examined in relation to boundary setting criteria used to delimit populations. A population of disaster response organizations is delimited, and then the boundaries of four subpopulations are set according to four different delimiting criteria. The model is tested on the total population and the four subpopulations. Strikingly different results are obtained for the various populations. These disparate findings are the result of confounding the delimiting variable with the independent variables in the model. An expanded theoretical model which includes one of the delimiting variables provides a solution. Recommendations concerning explicit use of boundary setting criteria are made. In particular, it is suggested that a delimiting criterion should not be associated with the dependent variable under study, and that social service organizations should be included in research on evacuation and disaster management.

This paper presents network analysis as a useful extension of conventional forms of analysis. It introduces and illustrates basic features of network analysis. Useful reference materials are suggested and data from a network of 87 emergency service organizations are used to illustrate a blockmodeling approach to network analysis. The discussion shows how network analysis can complement standard modes of analysis to bolster significantly the breadth and depth of theories useful to social work.

Glezer, Helen. 1991. Cycles of care: support and care between generations. Family Matters 30(Dec):44-46.

Concern is often expressed about the isolation of the nuclear family and the decline of extended family networks. AIFS Fellow Helen Glezer looks at how strong family links are between the generations, and how family members are supporting one another financially, practically and emotionally.

Gordon, Andrew J., and Mark Zrull. 1991. Social networks and recovery: one year after inpatient treatment. Journal of Substance Abuse Treatment. 8(3):143-152.

In an effort to understand the effect of social networks on outcome for treatment of alcoholism, a 1-year follow-up prospective study of 156 inpatients was undertaken. Treatment outcome was associated with diverse aspects of the social network: whether individuals were family, friends, or co-workers; the type of relationship-whether or not drinking together was part of social interaction; and the presence of social support, both perceived support and support through participation in treatment. Hierarchical path analysis using LISREL 6 was used to analyze the data. The active support of co-workers not regularly drinking with the patient and the perceived support of co-workers without respect to their drinking were influential in recovery, exerting positive and negative effects, respectively. The indirect effect of other variables indicates that nondrinking and drinking family and friend relationships also exert positive and negative effects, respectively. the authors suggest that a major factor in recovery is the ability to elicit and receive support. Improving this ability may be a fruitful objective in treatment.

Gottlieb, Benjamin H. 1991. Social support and family care of the elderly. Canadian Journal on Aging. 10(4):359-375.

This paper discusses different dimensions of social support which can be examined in the context of family care of the elderly. It calls for a greater measure of theoretical and empirical precision in relating specific types and sources of actual and perceived support to the particular demands and burdens faced by family caregivers at different stages in the course of caregiving. In addition, it spotlights three critical topics for future research: (1) analysis of the ways in which social suppport affects and is affected by chronic stressors; (2) examination of the determinants of actual and perceived support; and (3) the design and evaluation of interventions aimed to mobilize or augment the support provided to family caregivers.

Gould, Roger V. 1991. Multiple networks and mobilization in the Paris Commune, 1871. American Sociological Review 56(6):716-729.

Although sociologists increasingly recognize the importance of networks in social movement mobilization, efforts to understand network factors have been hampered by the operationalization of network factors as individual-level variables. I argue that disaggregating relational data into individual-level counts of social ties obscures the crucial issues of network structure and multiplexity. I analyze data on insurgency in the Paris Commune of 1871 and show that organizational networks and pre-existing informal networks interacted in the mobilization process, even in the final moments of the insurrection. Network autocorrelation models reveal that enlistment patterns in the Paris National Guard created organizational linkages among residential areas that contributed to solidarity in the insurgent effort, but the efficacy of these linkages depended on the presence of informal social ties rooted in Parisian neighborhoods. Thus the role of network factors can only be understood by studying the joint influence of formal and informal social structures on the mobilization process.

Grosser, Kerry. 1991. Human networks in organizational information processing. Annual Review of Information Science and Technology 26:349-402.

In this chapter Kerry Grosser reviews literature relating human networks and information processing in organizations and focuses on people as information sources. She includes a historical perspective and aims to introduce, identify themes and trends in literature, and illustrate writings and research that relate human networks to organizational information processing. Grosser argues that "human networks play a crucial informational role in organizations and that unless information professionals acknowledge their existence and learn to work through them in the planning and provision of information services, organizations will never achieve optimal effectiveness from their information resources."

Hagan, John. 1991. Destiny and drift: subcultural preferences, status attainments, and the risks and rewards of youth. American Sociological Review 56:567-581.

I combine the concept of drift, drawn from social control theory, and a life course conceptualization to elaborate a paradigmatic model to study cultural stratification. I apply this model in a thirteen-year panel study to examine the effects of adolescent subcultural preferences on later adult status attainments. Adolescents adrift from parental and educational control are more likely than those with more controls to develop mild or more seriously deviant subcultural preferences. I identify two distinct adolescent subcultural preferences: a subculture of delinquency and a party subculture. Among males with working-class origins, identification with the subculture of delinquency has a negative effect on trajectories of early adult status attainment. However, among males from non-working-class backgrounds, identification with a party subculture has a net positive effect when the negative effects of partying on educational performance are removed.

Hakimi, S. Louis, and Ching-Chung Kuo. 1991. On a general network location – production – allocation problem. European Journal of Operational Research 55(1):31-45.

In this paper we consider a network location – production – allocation problem in which demands are related to prices at markets. Profit maximization is achieved through the simultaneous determinations of plant locations and shipments between plants and markets. We show that even subproblems of some special cases of the general problem are NP-hard. For the NP-hard plant allocation problem, both a dynamic programming formulation and two heuristic algorithms are proposed. Empirical results reveal that both heuristic algorithms are attractive in practice, with one of them performing exceptionally well. We also show that the problem has a class of interesting special cases which can be solved in polynomial time.

Hannigan, John A. 1991. Social movement theory and the sociology of religion: toward a new synthesis. Sociological Analysis 52(4):311-331.

Despite a similar genesis in the classic nineteenth theories of social change, scholarly analyses of religious and social movements have frequently addressed different problems and formulated separate paradigms. This divergence is discussed with reference to historical, ideological, and conceptual factors. Current religions and social movements, it is proposed, increasingly have much in common both structurally and ideologically. Three processes – contestation, globalization, and empowerment – are identified as characteristic of contemporary movements. The article concludes by advocating a fresh perspective on religion and contemporary social movements where the central thrust would be on the construction of new grievances, identities, and modes of association by collective actors.

Hargrove, David S.. 1991. Public-academic linkages: introduction to the special issue. Community Mental Health Journal 27(6):389-391.

David Hargrove introduces the December 1991 issue of Community Mental Health Journal with a synopsis of several papers it contains. This issue, he explains, is devoted to the increasing linkages that are developing between public mental health providers and academic institutions. Prior to the 1960s the two had been independent of one another with little dialogue between them. Since the early 1960s, however, there have been several developments that have served to forge relationships between public agencies and colleges and universities.

Hartman, Karen, Christine M. Neuwirth, Sara Kiesler. Lee Sproull, Cynthia Cochrun, Michael Palmquist, and David Zubrow. 1991. Patterns of social interaction and learning to write: some effects of network technologies. Written Communication. 8(1):79-113.

This study examined the effects of computer network technologies on teacher-student and student-student interactions in a writing course emphasizing multiple drafts and collaboration. Two sections used traditional modes of communication (face-to-face, paper, and phone); two other sections, in addition to using traditional modes, used electronic modes (electronic mail, bulletin boards, and so on). Patterns of social interaction were measured at two times: 6 weeks into the semester and at the end of the semester. Results indicate that teachers in the networked sections interacted more with their students than did teachers in the regular sections. In addition, it was found that teachers communicated more electronically with less able students than with more able students and that less able students communicated more electronically with other students.

Hatch, Laurie Russell. 1991. Informal support patterns of older African-American and White women. Research on Aging. 13(2):144-170.

In this study of informal support patterns of older African-American and White women, a particular focus is the examination of potential interaction effects between race and variables representing three major areas of life experience: family, paid work, and religious participation. Using data from the National Survey of Families and Household, results from regression analyses show statistically significant interaction effects between race and religious participation. Specifically, for four dependent variables measuring dimensions of giving and receiving help, attendance at religious social events was more important in predicting the informal support patterns of older African-American women than those of older White women. These results provide support for Taylor's recommendation that formal service providers use the organizational structure of churches to more effectively provide services to African-American elderly. Results from this study also raise questions concerning whether the hierarchy of primary care providers reported in the caregiving literature is applicable to members of different racial or ethnic groups.

Havassy, Barbara E., Sharon M. Hall, and David A. Wasserman. 1991. Social support and relapse: commonalities among alcoholics, opiate users, and cigarette smokers. Addictive Behaviors 16(5):235-246.

Links between social support and relapse were examined in a study of alcoholics, cigarette smokers, and opiate users completing treatment for drug use (N = 221). Subjects were followed weekly until relapse fora maxi-

mum of 12 weeks after the end of treatment. Structural and functional social support and support for abstinence and drug use were investigated. With demographic variables and drug-treatment group controlled, greater structural support (as measured by an index of social integration and by partner status) predicted a lower risk of relapse. Greater experienced partner support for abstinence also predicted lower risk. Social network members' use of the subject's problem drug predicted heightened relapse risk, but the effect was not statistically significant. This study contributes to a cross-drug model of relapse. It highlights the importance of social integration and abstinence-specific functional support in predicting the risk of relapse, independent of the particular drug of abuse.

Haynes, Petal Pearl Nneka. 1991. The relationship between the friendships of nursing home residents and their morale. Journal of Negro Education. 60(3):459-466.

The present study investigates the possible correlation between the friendships of nursing home residents and their level of morale. The existence of friendships that residents shared with other residents, staff members, and family members outside the institution was ascertained via questionnaire.

Heise, David R. 1990. Desktop network analysis. Contemporary Sociology 19(6):799-804.

This article details use of the Version 4.1 of Ronald S. Burt's STRUCTURE Network Analysis System that is available in the Basic, Reference, Advanced, and Special Editions. This software for sociological applications is one of a growing number of programs for microcomputer use. All four editions are outlined as are examples of other microcomputer programs. The data-definition menu and the analysis menu are discussed. Author Heise provides the sociological and technological benefits of STRUCTURE and evaluates the system on its performance.

Hobson, Barbara. 1991. Reply to Popenoe. AJS 97(3):846-848.

This article is a reply to David Popenoe's comments (AJS 97:3 1991) on Hobson's review (AJS 96[Nov] 1990) of his book Disturbing the Nest (1988). Hobson responds to Popenoe's characterization of her review as "ideologically driven debating." Hobson also provides examples of what she considers to be Popenoe's erroneous statistics and conclusions.

Hopper, Kim. 1991. Some old questions for the new cross-cultural psychiatry. Medical Anthropology Quarterly. 5(4):299-330.

The WHO cross-cultural studies of schizophrenia exemplify both the achievements and the pitfalls of large-scale psychiatric epidemiology. Their logistical and technical advances have been justly celebrated; the consistent—and unexpected—findings of better outcome in the developing than in the developed world continues to vex analysts. At the same time, anthropological critics have not been shy about pointing up the limitations and blind spots of such research. Criticisms range from charges of ethnocentrism and category errors in the psychiatric research enterprise itself, especially the inapplicability of its disease taxonomy to some non-Western cultures, to translation difficulties, the suspect and "thin" quality of questionnaire-generated accounts of illness, disregard for variant understanding of the "self," and the naivete of treating culture as a set of variables. Not all of these objections, I argue, are well-founded; some more properly reflect persisting instabilities in anthropological theory. This critical commentary all but ignores the striking epidemiological findings in the West that dispute the received wisdom of chronicity as the natural trajectory of schizophrenia. A natural alliance awaits realization between clinicians—newly alerted to ill-understood factors affecting course and outcome—and fieldworkers—bent on close ethnographic analysis of the configurations and roles of beliefs, work, kin-based support, the uses of public space, and "the natives'" own understanding of what ails them.

Hoyert, Donna L. 1991. Financial and household exchanges between generations. Research on Aging. 13(2):205-225.

Both foundations of the modified extended family model, residential location and marital status, determine exchange patterns. Another dimension of family exchange is the history of relationships; adult children were once members of the nuclear household and relationships and patterns of exchange began in that setting. Families build on past relationships as well as being responsive to differences in the needs of its family members. Furthermore, the number of parent-child dyads within a family affect interaction patterns.

Hubert, Lawrence, and Phipps Arabie. 1991. The assessment of spatial autocorrelation through constrained multiple regression. Geographical analysis 23(2):95-111.

Most published measures of spatial autocorrelation (SA) can be recast as a (normalized) cross-product statistic that indexes the degree of relationship between corresponding entries from two matrices - one specifying the spatial connections among a set of n locations, and the other reflecting a very explicit definition of similarity between the set of values on some variable x realized over the n locations. We first give a very brief sketch of the

basic cross-product approach to the evaluation of SA, and then generalize this strategy to include less restrictive specifications for the notion of similarity between the values on x. Using constrained multiple regression, the characterization of variate similarity basic to any assessment of SA can itself be framed according to the information present in the measure of spatial separation. These extensions obviate the inherent arbitrariness in how SA is usually evaluated, which now results from the requirement of a very restrictive definition of variate similarity before a cross-product index can be obtained.

I combine the concept of drift, drawn from social control theory, and a life course conceptualization to elaborate a paradigmatic model to study cultural stratification. I apply this model in a thirteen-year panel study to examine the effects of adolescent subcultural preferences on later adult status attainments. Adolescents adrift from parental and educational control are more likely than those with more controls to develop mild or more seriously deviant subcultural preferences. I identify two distinct adolescent subcultural preferences: a subculture of delinquency and a party subculture. Among males with working-class origins, identification with the subculture of delinquency has a negative effect on trajectories of early adult status attainment. However, Among males from non-working-class backgrounds, identification with a party subculture has a net positive effect when the negative effects of partying on educational performance are removed.

Hurlbert, Jeanne S. 1991. Social networks, social circles, and job satisfaction. Work and Occupations. 18(4):415-430.

This paper tests the proposition that social networks serve as a social resource which affects job satisfaction through the provision of social support. Drawing from the literature on job satisfaction and social support, the author argues that three types of networks are likely to affect job satisfaction: dense networks, social circles composed of co-workers, and kin-centered networks. Data from the 1985 General Social Survey, indicates that co-worker social circles and kin-centered networks positively affect job satisfaction and that certain of these network effects vary by contextual factors.

Irwin, Michael D., and John D. Kasarda. 1991. Air passenger linkages and employment growth in U.S. metropolitan areas. American Sociological Review. 56(Aug):524-537.

Despite the ubiquity of air travel and the critical role of transportation in spatial processes, no sociological work on the consequences of aviation has been produced in nearly three decades. We analyze the relationship between the structure of the airline network and employment growth in 104 metropolitan areas. Using network methodology, we document the structural changes that accompanied the expansion of the airline system between 1950 and 1980. Using regression analysis and nonrecursive models, we assess the effects of these changes in the airline network on metropolitan employment growth rates, focusing specifically on employment in manufacturing and producer services. Results indicate that position in the airline network has pervasive effects on metropolitan employment growth and that changes in network position are a cause rather than a consequence of this employment growth. We conclude that the reorganization of the airline network has been a critical factor transforming and integrating the spatial economy of the U.S.

Ito, Minoru. 1991. Les mouvements du personnel comme vecteurs des transferts de technologie et de la competitivite des entreprises japonaises. Sociologie Du Travail. 33(1):105-117.

Si l'on commence a connaitre les caracteristiques de la production japonaise de haute technologie, on connait moins l'organisation des < reseaux humains > qui sous-tendent ce systeme, notamment a partir de la RD. C'est ce que presente ici l'auteur en se referant principalement a l'industrie des semi-conducteurs, ou il est particulierement important d'assurer la continuite des competences et savoir-faire pour assurer l'integration de technologies complexes et la rapidite de response au marche pour gagner sur le front de la competitivite. Cela necessite en particulier une forte flexibilite et la mobilite des salaries.

John, Robert. 1991. Family support networks among elders in a Native American community: contact with children and siblings among the Prairie Band Potawatomi. Journal of Aging Studies. 5(1):45-59.

Although a great deal is known about family support networks among older whites, little is known about family support networks among older whites, little is known about the workings of family support networks among elderly Native Americans. Face-to-face interviews focused on the availability and proximity of kin and the frequency of nine common family activities with each child and sibling. The effects of proximity, gender, marital status, and the equity of helping relationships on family support network operation are analyzed revealing similarities and differences with previous research findings among Anglos. Differences with previous research findings include that the strongest sibling tie is between brothers rather than between sisters, the presence of a spouse insulates elders rather than invigorates contact within the network, and marital dissolution (whether through widowhood, divorce or

separation) does not isolate elders from children or siblings. The study concludes with suggestions for future research to refine our understanding of family support network operation.

Johnson, Jeffrey C., G. Michael Poteat, and Marsha Ironsmith. 1991. Structural vs. marginal effects: a note on the importance of structure in determining sociometric status. Journal of Social Behavior and Personality 6(3):489-508.

Sociometric measures have traditionally been used in the classification of rejected and neglected preschool children. Identifying children who may potentially lack appropriate social skills can provide opportunities for early interventions, thereby diminishing the chances of future adjustment problems. Classification has generally been based on positive nominations, negative nominations, and peer ratings. Indices of social preference and social impact are used to classify children as popular, average, rejected, and neglected. These measures, based on column marginals, can obscure important structural information. This paper describes different structural conditions under which the nature of social rejection, and its reliability, can vary, something that would be obscured with the use of traditional methods Alternative approaches to sociometry based on quantitative analysis of social network structure and relations are discussed. Finally, these alternate methods suggest categories of rejection that have potential implications for understanding severity and prescribing intervention strategies.

Jones, Diane Carlson. 1991. Friendship satisfaction and gender: an examination of sex differences in contributors to friendship satisfaction. Journal of Social and Personal Relationships. 8(May):167-185.

The purpose of this research was to examine differences in characteristics associated with the core provisions of friendship, namely, intimacy, mutual assistance and companionship. Although sex differences in the magnitude of these provisions were expected, it was hypothesized that the characteristics would function in a similar manner to promote friendship satisfaction. An additional goal was to provide an empirical evaluation of the relative contribution of the three types of provisions to friendship satisfaction. In Study 1, trust in male and female friends (intimacy), orientation to assistance (communal and exchange) and companionship attributes of friends were examined as elements of the individual's cognitive conceptions of friendships. The females (n=94) reported greater trust in males, a more communal orientation to assistance and greater friendship satisfaction. Regression analyses revealed that for both males (n=80) and females, trust in male friends contributed to friendship satisfaction while an exchange orientation detracted from it. In Study 2, seventy-eight males and sixty females indicated the levels of self-disclosure, reciprocal exchange of assistance, enjoyment and negativity in their established friendships. Sex differences were evident in the magnitude of self-disclosure and friendship satisfaction reported by males and females. For both males and females, self-disclosure and friendship enjoyment were the significant predictors of friendship satisfaction. Overall, this research demonstrates that the characteristics associated with intimacy, namely self-disclosure and trust, and the affective tone associated with companionship are the most important contributors to friendship satisfaction for both males and females.

Julien, Danielle, and Howard J. Markman. 1991. Social support and social networks as determinants of individual and marital outcomes. Journal of Social and Personal Relationships 8:549-568.

This study examined the effects of social support, within and outside marriage, on the individual and marital adjustment of eighty-seven married couples. Stress, functional and structural measures of spouses' supportive networks, and outcome variables were included in two models that were represented as path diagrams and tested for husbands and wives, respectively. As predicted, marital distress was associated with higher mobilization of outsiders for support, but outsiders mediated rather than counteracted the negative effects of marital distress on spouses' health. Contrary to expectations, husbands' mobilization of their wives' support was positively associated with their levels of symptoms, and compared to wives, husbands' mobilization of their partners' help was more weakly associated with their marital adjustment. Results are discussed with respect to models of the interaction between spouses' and outsiders' support.

Kandel, Denise, and Mark Davies. 1991. Friendship networks, intimacy, and illicit drug use in young adulthood: a comparison of two competing theories. Criminology 29(3):441-469.

Theories of delinquency posit two opposing views on the social interaction of deviant individuals. Social control theory assumes that deviants have poor relations with others. Cultural deviance theory assumes that deviant individuals are similar to nondeviants and have strong ties with members of their friendship networks. These theories have not been empirically tested for male and female users of elicit drugs. Descriptive and multivariate analysis are reported here for young adult men and women aged 28-29, who were asked about their same-sex and opposite-sex in general and three specific close friends. Few differences were found in the characteristic of friendship networks of elicit drug users and nonusers. where differences were observed, the frequent users tended to have more intimate friends than other young adults, which supports the cultural deviance perspective. Structural

equation models predicting two latent components of intimacy, confining and interacting, with the three closest friends and same-sex and opposite-sex friends indicate that, controlling for other determinants of intimacy with friends, illicit drug use retains a unique effect and predicts substantially higher levels of intimacy among males. The strong social ties of adult drug-using males will make it more difficult to develop effective intervention strategies targeted toward individual users.

Keane, Carl. 1991. Socioenvironmental determinants of community formation. Environment and Behavior. 23(1):27-46.

Although environmentalists have bemoaned the loss of community with increasing urbanization, other urban scholars have optimistically argued that urban characteristic provide increased opportunities for social interaction. Little research, however, has examined the relationship between urban characteristic and specific forms of community life, such as social support. Secondary data analyses were conducted on a sample of 442 public housing residents. This article suggests that socioenvironmental factors act to both push and pull individuals into different types of social interaction in different locals.

Kilduff, Martin. 1992. The friendship network as a decision-making resource: dispositional moderators of social influences on organizational choice. Journal of Personality and Social Psychology 62(1):168-180.

The patterns of interview choices of 170 Masters of Business Administration students were tracked unobtrusively over 5 months. Two personality variables, self-monitoring (SM) and social uniqueness, were used to partition the sample. The results confirmed that personality types hypothesized to differ in their preferences for social comparison information did differ significantly both with respect to how much their decision patterns resembled those of their friends and with respect to the criteria they used in the decision-making process. In contrast to recent critiques of the SM construct, the research provides evidence in support of an SM typology assessed by a unitary factor underlying responses to the Self-Monitoring Scale. In general, the results suggest that the social network, as a decision-making resource, may be as much an expression of personality as it is a constraint on individual choice.

Kilgore, Sally B. 1991. The organizational context of tracking in schools. American Sociological Review. 56(April):189-203.

The study of tracking patterns in secondary schools is central to understanding the educational attainment process. In this paper I offer a conceptual framework for evaluating school tracking patterns meritocratic, arbitrary, exclusive, or inclusive. Tracking patterns are hypothesized to emerge under different organizational contingencies. In particular, the type of structural constraints, the informational flow within the school, and the cultural milieu evident among the staff are thought to affect the likelihood that one type of tracking pattern would emerge rather than another. A preliminary analysis suggests that students demand for a given track, which is a structural constraint, affects the degree to which exclusive tracking occurs. Social networks among students and teachers as well as teacher control over grouping policy are found to affect the likelihood of inclusive or exclusive tracking patterns, and the cultural milieu of the staff affects the degree to which exclusive or inclusive tracking occurs. No clear evidence for a press toward arbitrary tracking is observed.

Kim, Hyun J., and James B. Stiff. 1991. Social networks and the development of close relationships. Human Communication Research. 18(1):70-91.

This study examines the relationship between close heterosexual relationships and their social networks of close friends and family members. The central proposition of this study states that relational development will be positively associated with each partner's involvement in the other's social network and the degree of overlap in the individual social networks of each partner. Generally, the findings were consistent with this proposition. Among the indicators of network involvement and overlap, the range of network involvement (i.e., number of known members in the partner's network) emerged as the most powerful predictor of relational development. Findings are reviewed in light of existing theories and research, and suggestions for future research are made.

King, Ambrose Yeo-chi. 1991. Kuan-hsi and network building: a sociological interpretation. Daedalus 120(63):63-84.

This article is a discussion on the Chinese concept of kuan-hsi (personal relationship) and network building. The author states that kuan-hsi and other sociocultural concepts are the key to understanding Chinese social structure. Kuan-hsi has remained strong in mainland China and is prevalent in communities elsewhere.

King, Timothy B. 1991. The impact of electronic and networking technologies on the delivery of scholarly information. The Serials Librarian 21(2-3):5-17.

King presented this paper at the annual conference (1991) of the North Americans Serials Interest Group, Inc. (NASIG). King predicts that by the year 2006 we will look back to recognizable changes in the way information is accessed and delivered. One prediction is that though there will be role changes, electronic networks will be widespread and there will still be print mediums. New work with electronic mediums will take place alongside existing media. King notes the impact of electronic and networking technologies on four phases or aspects of scholarly communication: (1) finding out what is going on but not yet published; (2) staying current with what has just been published; (3) searching the literature, and; (4) collaborating on research at a distance.

Knoke, David, and Franz Urban Pappi. 1991. Organizational action sets in the U.S. and German labor policy domains. American Sociological Review. 56(August):509-523.

Legislative fights over national policy are often examined from an organizational state perspective – public authorities and organized interest groups form temporary coalitions to influence the outcomes of public policy. We extend this approach using the concepts of event public, collective actor, action set, and opposition network. Analyses of communications network and policy event participation data from the U.S. and German national labor policy domains in the 1980s reveals similar spatial patterns in three dimensions: Opposing business and labor coalitions structured many of the legislative fights; no central body emerged to coordinate actions; and organizational interests were central to action-set formation. Political resources played a minor role. Structural differences between German and U.S. domains are attributed to institutional contexts.

Komorita, S.S., J.A. Hilty, and C.D. Parks. 1991. Reciprocity and cooperation in social dilemmas. Journal of Conflict Resolution. 35(3):494-518.

A social dilemma is a situation in which two or more individuals receive a higher payoff for a competitive choice than for a cooperative choice, no matter what the other members choose, but all members are better off if all cooperate than if all compete (Dawes 1980). Behavior in social dilemmas is an important research problem because it is a prototype of many real-life problems facing society, for example environmental pollution (Dawes, McTavish, and Shaklee 1977), overpopulation (Hardin 1968) and resource depletion (Cass and Edney 1978). Although there are many types of social dilemmas (Messick and Brewer 1983), we shall restrict ourselves to the special case of the two-person prisoner's dilemma (PDG)...In the present study we examined the effects of strategies used by others on the effects of reciprocal strategies on the induction of cooperation in the PDG.

The main purpose of this study was to evaluate some of the propositions of the TFT [tit-for-tat] strategy. In addition to the effects of delay of reciprocity the effects of niceness and of clarity (Axelrod 1984) were also assessed.

Krauss, Marty Wyngaarden, Marsha Mailick Seltzer, and Stanley J. Goodman. 1992. Social support networks of adults with mental retardation who live at home. American Journal on Mental Retardation 96(4):432-441.

The social support networks of 418 adults with mental retardation who live at home were found to be large, durable, active, and diverse in their composition. Family members predominated as members of these support networks. Differences were found in many network characteristics based on the gender and level of mental retardation of the adults. Males and those with the most severe mental retardation were found to be at risk for social isolation. Contrasts with the social support networks of adults in nonfamily settings were discussed.

Larson, Andrea. 1991. Partner networks: Leveraging external ties to improve entrepreneurial performance. Journal of Business Venturing. 6(3):173-188.

This paper examines the conditions under which successful partnership networks were formed by four entrepreneurial companies. Seven alliance partnerships were studied. Both sides benefitted through product advances, administrative process improvements, and rapid response times due to the greater levels of information exchange and coordination through computers. Key to understanding the partnership was the development of trust between organizations. The value of these partnerships in terms of benefits to smaller companies has not received adequate attention in the literature. Yet forging such collaborative alliances seems crucial in explaining the ability of smaller firms to grow and to innovate.These networks should be seen as a competitive alternative to vertical integration. Smaller-scale entrepreneurial lack the financial resources to vertically integrated steps in the value added chain. This research suggests that a network organizational form can be cultivated by smaller companies to realize the benefits to vertically integrated functions while avoiding the bureaucratic inefficiencies of that organizational form. The network strategy of building close collaborative alliances with a limited set of suppliers and customers enables a firm to stabilize itself while remaining flexible and responsive to a changing market. An important aspect of strategic planning for the entrepreneurial firms is to identify prospective partners and con-

sciously initiate and build partnerships with responsive firms. The data gathered indicated that these alliances do not form by chance but can be studied as patterned, predictable exchange structures that can be replicated and used to improve a firm's competitive position against larger players. The paper argues for an expansion of our concept of entrepreneurship to include the effective management of partnership networks. We should also expand our ideas about organizational forms to recognize the network structure as an effective governance arrangement for entrepreneurial companies. The findings strongly suggest that entrepreneurial firm's ability to identify, cultivate, and manage these network partnerships is critical to survival and success.

Lee, Thomas W., and Terence R. Mitchell. 1991. The unfolding effects of organizational commitment and anticipated job satisfaction on voluntary employee turnover. Motivation and Emotion. 15(1):99-121.

An evolving discontent with existing theories of voluntary turnover led to the postulation of an "unfolding model" for the effects of organizational commitment and anticipated job satisfaction on voluntary employee turnover. In particular, existing theory and research on voluntary turnover were judged to apply validly to only a very small number of organizational situations. That is, their ecological validity appears weak. As a result, the proposed model seeks to describe more of the organizations's reality and to apply to more situations than do current theories. Thus, the proposed model seeks to increase ecological validity. Four decision paths are detailed and asserted to capture more of the evolutionary (hence the term "unfolding") confluence of personal, situational, and accidental forces on the decision to leave an organization than current models. Research implications are discussed.

Leik, Robert K. 1991. Strategic timing in network processes. Advances in Group Processes 8(8):1-28.

Studying social power as a function of network linkage has generated important advances. However, unrealistic constraints of models and laboratory experiments lead to treating networks as fixed, whereas in real networks, manipulators can effect as much power advance through altering linkages as through the deals formed within existing linkages. A set of rules is developed which seem to replicate profits earned by subjects in experiments by Markovsky, Willer, and Patton (1988). Those rules are then used to demonstrate that an actor who has the opportunity to effect simple linkage deals can gain power via those deals. Further, it is shown that, in large enough networks, the timing of particular deals can alter how much power the Dealmaker can eventually obtain. A series of propositions is presented as the beginning of a theory of strategic timing in the pursuit of power by manipulation of social networks.

Lepore, Stephen J., Gary W. Evans, and Margaret L. Schneider. 1991. Dynamic role of social support in the link between chronic stress and psychological distress. Journal of Personality and Social Psychology. 61(6):899-909.

How a chronic environmental stressor can interfere with the buffering effects of social support by eroding social support was analyzed in this prospective, longitudinal study. A classic buffering effect of support was found after 2 months of exposure to the stressor, household crowding. Crowded residents with low perceived support had greater increases in psychological distress than did crowded residents with high perceived support. However, after 8 months exposure the buffering effect disappeared. Moreover, greater crowding had become directly associated with lower support, which in turn was associated with greater increases in psychological distress. All analyses controlled for prior distress. Under some types of chronic stress, the buffering effects of social support may be short-lived because the stressor eventually erodes social support.

Leydesorff, Loet. 1991. The static and dynamic analysis of network data using information theory. Social Networks 13:301-345.

Information theory provides us with methods for both the static and dynamic analysis of network data. Since the models are derived within one framework, the results of the multivariate analysis and the time-series analysis can be made relevant for one another. Additionally, using the static model, one can create an exact dendrogram, and determine the precise number of clusters. The algorithm is generalizable to clique analysis. Using the dynamic model, developments can be revealed which were not suggested by the comparison of results of various forms of multivariate analysis for each year separately. The question of using these methods to design research about structure/action relations is discussed.

Lin, Nan, and Yanjie Bian. 1991. Getting ahead in urban China. AJS 97(3):657-688.

This article argues that structural segmentation is a universal phenomenon in all complex societies and across political economies. Each political economy uses specific criteria in delineating segments of its economic and work organizations. Furthermore, it is argued that segmentation identification constitutes a critical destination status for individuals engaged in the status-attainment process. A representative sample of the working population in Tianjin, China, is analyzed to show that entrance into the core sectors (state agencies and enterprises), rather than the job per se, constitutes the primary goal of status attainments. Entering into a more desirable work-unit sector in China takes on differential significance and process for males and females. For males, the direct effect of intergeneration-

al factors (i.e., the effect of father's work-unit sector) is evident. For females, such an effect is only indirect; instead, to a great extent, their status attainment depends directly on their own educational attainment. Also, upward occupational mobility across sectors (from the peripheral to the core) between first and current jobs is substantially greater among male workers (over 60%) than among female workers (20%). Likewise, males benefit more from social resources (the use of social contacts and their resources) in the job search than females. These findings shed light on the significance of political economy in defining statuses and the viability of the industrialization-attainment thesis. They also point to other operating processes that transcend the effects of political economy or industrialization. Specifically, these explanatory schemes do not yet prove adequate in accounting for gender differences and the use of social resources in the status-attainment process.

Lovell, Madeline L., and Cheryl A. Richey. (1991). Implementing Agency-based Social-Support Skill Training. Families in Society: The Journal of Contemporary Human Services. 72(9):563-572.

Social support is a critical component in adequate child rearing, especially among multiproblem families at risk for child maltreatment. The authors describe the implementation of a group training program designed to help high-risk parents build more effective social supports by strengthening their prosocial attitudes and interpersonal skills. Intervention was structured around the Relationship Roadmap, a metaphoric drawing illustrating the stages of relationship development. A three-month case management follow-up enhanced the achievement of group members' individual goals. Discussion centers on the challenges of integrating an experimental training project into a host agency program.

Macy, Michael W. 1991. Chains of cooperation: threshold effects in collective action. American Sociological Review 56(December):730-747.

Granovetter's threshold model of collective actions shows how each new participant triggers others until the chain reaction reaches a gap in the distribution of thresholds. Hence outcomes depend on the network of social ties that channel the chain reactions. However, structural analysis is encumbered by the assumption that thresholds derive from changing marginal returns on investments in public goods. A learning-theoretic specification imposes less stringent assumptions about the rationality of the actors and is much better suited to a structural analysis. Computer simulations suggest that threshold effects may be the key to solving the coordination problem: When individual choices are contingent on participation by others, this interdependence facilitates the coordination of contributions needed to shift the bistable system from a noncooperative equilibrium to a cooperative one. Further simulations with low-density networks show that these chain reactions require bridges that link socially distant actors, supporting Granovetter's case for the strength of weak ties.

Macy, Michael W. 1991. Learning to cooperate: stochastic and tacit collusion in social exchange. AJS. 97(3):808-843.

The Prisoner's Dilemma formalizes the social trap that arises when individually rational choices aggregate with mutually undesirable consequences. The game-theoretic solution centers on the opportunity for tacit collusion in repeated play. However, not all actors grasp the strategic implications of future interaction. Accordingly, this study reformulates the game as a stochastic learning model in which the behavior of interdependent actors is continually shaped by sanctions and cues generated by their interaction. Computer simulations of a two-person game show that adaptive actors are led into a social trap more readily than are fully rational actors, but they are also better at finding their way out. Prosocial norms appear to be a consequence rather than cause of cooperation but useful in promoting forgiveness of random deviance. The model is than elaborated as an N-way Prisoner's Dilemma. Simulations show how the effects of network size, density, mobility, and anonymity derive from a fundamental principle of collective action, that is, the need to reduce the number of choices that must be fortuitously coordinated in order to escape noncooperative equilibrium. The results also suggest how network structure might evolve in tandem with the cooperation it facilitates.

Madigan, Timothy J., and Dennis P. Hogan. (1991). Kin access and residential mobility among young mothers. Social Science Quarterly. 72(3):615-622.

This research note investigates whether young women who become single mothers improve their access to kin assistance by residential mobility that maximizes geographic proximity of kin. Such women may remain in the home longer than others or move closer to kin. Multivariate analyses of nationally representative sample survey data indicate that women who become single mothers (1) do not have reduced rates of departure from the parental home and (2) do not systematically improve kin proximity.

Malcolm, Atholl T., and Michel Pierre Janisse. 1991. Additional evidence for the relationship between Type A behavior and social support in men. 17(3):131-134.

This study examined social support as a mediator of susceptibility to coronary disease in Type A individuals. Sixty-four male subjects completed the Jenkins Activity Survey and the Sarason Social Support Questionnaire. The correlations between Type A scores, the speed and impatience and hard-driving competitiveness factors of the Jenkins survey, and Sarason's social support were found to be negative, which was contrary to earlier findings. The authors hypothesize that these differing results may be a function of age and environment. Finally, and pertinent to the mechanism by which social support may be associated with coronary heart disease, systolic blood pressure was negatively correlated to satisfaction with social support.

Mancini, Jay A., and Rosemary Blieszner. 1992. Social provisions in adulthood: concept and measurement in close relationships. Journal of Gerontology: Psychological Sciences 47(1):14-20.

Social gerontologists are increasingly concerned about examining the nature of close relationships among the elderly. Theoretically grounded and empirically validated instruments are needed to advance research in this area. We analyzed the psychometric properties of the Social Provisions Scale using data from a probability sample of 494 community residents aged 65 or older. The theoretical foundation of the scale is Weiss's delineation of social support functions of close relationships. Confirmatory factor analysis revealed a pattern in the data that corresponds to the theoretical definition of relational provisions: Factor 1 was Intimacy; Factor 2 was Social Integration; Factor 3 was Reassurance of Worth; and Factor 4 was Opportunity for Nurturance. Alphas for the four scales ranged from .83 to .94. Convergent validity was supported by significant correlations between the Social Provisions Scale (SPS) and respondent's morale, frequency of contact with friends, feelings of closeness with an adult child, relationship control, and relationship conflict. Discriminant validity was supported by nonsignificant correlations between the SPS and the Eysenck Lie Scale.

Markovsky, Barry, Travis Patton, and David Willer. 1988. Power relations in exchange networks. American Sociological Review 53(April):220-236.

Many theories address the problem of how a social structure affects the experiences and behaviors of its members. This paper offers a network-exchange theory to solve this problem. Previous research has shown that the nature and outcomes of negotiations among individual or corporate actors can be inferred from their network positions. The impact of this research has been limited because its theory does not enable the researcher to locate power positions in the networks. We offer a theory that is both consistent with all previously reported experimental research and is generalized to conditions not considered by other formulations. In addition to supporting derived hypotheses pertaining to network-based power, our experiments demonstrate, among other things, that certain unstable networks break down to form stable substructures and that some networks contain overlapping but autonomous domains of power and exchange.

McCloskey, Michael. 1991. Networks and theories: the place of connectionism in cognitive science. Psychological Science 2(6):387-395.

This article considers how connectionist modeling can contribute to understanding of human cognition. I argue that connectionist networks should not be thought of as theories or simulations of theories, but may nevertheless contribute to the development of theories.

McWilliams, Susan, and Philip Blumstein. 1991. Evaluative hierarchy in personal relationships. Advances in Group Processes 8(8):67-88.

While social scientists generally concede that hierarchy is a ubiquitous feature of social organization, much conceptual work remains to be done on how evaluative hierarchy manifests itself in every day life, particularly in the context of close relationships. To this end, this paper addresses the following questions: (1) How do the meaning and effects of status characteristics in close relationships differ from their implications in other, less personal group settings? (2) How do the behaviors people themselves engage in become realized status resources in close relationships? (3) How are these two sources of evaluative hierarchy interrelated? The emphasis on evaluative rather than structural hierarchy reflects the dramaturgical perspective which informs the paper more generally. The ideas of a number of authors are combined with the work of Goffman on stigma (1963), remedial interchange (1971), and deference and demeanor (1967). An argument is made for the significance of inequality, even in those relationships believed to be less determined by roles and social category membership. To this end, the paper considers the mutual relationship between the more static principles of societal stratification and the evanescent rituals guiding the ebb and flow of moral worth in close relationships.

Menou, Michel J., Jean-Francois Giovannetti, and Bernadette Dupeuble. 1991. BABINAT and the development of microcomputer-based national documentation networks in the less developed countries. Information Processing and Management 27(6):699-712.

The application of microcomputers in support of national information systems is rapidly spreading in most of the Less Developed Countries (LDCs). The advantages and limitations of the technology in these countries are discussed. Hardware and software compatibility are not as important a requirement in this context as the availability of an adapted reference format, which the present standard formats do not properly meet. The application should take into account the specific constraints of national information systems in LDCs, including the need to minimize the repetitive recording of the same data elements and to secure full compatibility with international information systems. BABINAT has been designed toward this end by a consortium of French organizations which currently support the development of information systems in the LDCs. Its rationale, characteristic features, and development are presented.

Miller, Baila, and Stephanie McFall. 1991. Stability and change in the informal task support network of frail older persons. The Gerontologist. 31(6):735-745.

This study examines predictors of stability and change in composition, size, and intensity of help of the informal task support networks of frail elders and their primary caregivers. The sources of data are the 1982 and 1984 National Long Term Care Surveys and the companion 1982 Informal Caregivers Survey. There was slightly more stability than change in the size and composition of family task support networks. We found little evidence that shifts in network composition were in the direction of including more distant kin. Changes in network size and intensity of help occurred in response to changes in health and functional status of the frail older person, but not in response to the level of burden of the primary caregiver.

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Recent theory and research on social exchange neglects a central concern of early exchange theorists: the satisfaction of actors with their relations. I apply the framework of contemporary exchange theory to the analysis of satisfaction using data from a series of experiments on power in exchange networks. I investigated four main questions:(1) how the base of power (reward or punishment) affects the relation between outcomes and satisfaction; (2) how within- and between-relation outcome comparisons affect satisfaction in negatively-connected exchange networks; (3) how dynamic exchange processes, net of exchange outcomes, affect satisfaction; and (4) how actors position of power affect each of these relations. Based on a theoretical analysis of how the structure, process, and outcomes of exchange should affect actors' expectations, I test predictions of their effects on satisfaction. The results provide substantial support for the hypotheses.

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Sabatelli, Ronald M., and Stephen A. Anderson. 1991. Family system dynamics, peer relationships, and adolescents' psychological adjustment. Family Relations. 40(4):363-369.

The patterns of differentiation within the marital, parental, and parent/child relationships and the level of support experienced within peer relationships are examined as predictors of reported levels of anxiety and depres-

sion in a sample of late adolescents. One of the more striking results is the finding that peer support and system dynamics, particularly the level of differentiation reported in the marital subsystem, significantly covaried with reported levels of depression. With respect to the analyses on reported levels of anxiety, only the differentiation level found within the parental subsystem and within the mother/child reciprocal relationship emerged as statistically significant predictors. Finally, adolescent participation in a cross-generational coalition was associated with higher reported levels of anxiety and depression. These results are presented in conjunction with clinical implications that emphasize the need for clinicians to attend to broader system dynamics, not only parent/child dynamics, when treating adolescents.

Saxenian, AnnaLee. 1990. Regional networks and the resurgence of Silicon Valley. California Management Review 33(1):89-112.

This article addresses the revitalization of Silicon Valley during the 1980s. A surge of semiconductor start-ups were the result of revolt by engineers against already established firms that were failing to meet customer expectations and failing to follow technical leads. "By building on the social networks and industrial infrastructure which were created and then abandoned by the established semiconductor firms, these small and medium-sized enterprises pioneer[ed] a new Silicon Valley—one which fosters collaboration and reciprocal innovation among networks of specialist producers."

Schmidt, Ralph. 1991. The Inquiry Agency—a concept for networking in innovation oriented services. Nachrichten Fur Dokumentation. 42:131-139.

the article presents a concept to intensify specialized reference and inquiry activities and to develop supporting information relations among existing information services. Currently observable reservations of small and medium-sized firms concerning a strengthened usage of online information are treated, actually shown information needs in medium-sized enterprises are characterized and from this position a recommendation to coordinate and to optimize existing inquiry services is derived. The author describes characteristic functions and components of inquiry agencies and points out that the harmonization of inquiry standards is an essential condition to ensure quality in the field of inquiry services. In this context the development of informal networks among inquiry agencies is emphasized as particularly important for an extensive, user-oriented, and efficient inquiry service.

Schonfeld, Irvin Sam. 1991. Dimensions of functional social support and psychological symptoms. Psychological Medicine 21(4):1051-1060.

In the summer following graduation a sample of 125 female college graduates (mean age = 28) completed Cohen & Wills' ISEL (1985) which includes scales measuring four social support functions: belonging (social companionship), appraisal (availability of confidants), tangible (instrumental), and self-esteem support. In the summer and fall subject status on two outcome scales was ascertained: the Psychophysiologic Symptom Scale and the Center for Epidemiologic Studies Depression Scale (CES-D). Reliability of the difference scores suggested that the ISEL scales do not measure entirely different constructs and the ISEL Self-esteem Scale is operationally redundant with the Rosenberg Self-esteem scale and the CES-D. Cross-sectional analyses indicated that the ISEL scales were related to symptoms. By contrast, standard longitudinal and prospective MLR analyses indicated that only the Belonging Scale was significantly related to future symptoms. The issues of confounding support with symptoms and the dimensionality of the subscales were discussed. The study suggests that specific functions of support take on greater importance during major life transitions and that any one supportive behavior often serves multiple functions.

Segal, Steven P., and Jane Holschuh. 1991. Effects of sheltered care environments and resident characteristics on the development of social networks. Hospital and Community Psychiatry 42(11):1125-1131.

Two hundred and thirty-four members of a 1973 sample of sheltered care residents, three-fourths of whom had schizophrenic disorders, were followed up between 1983 and 1985 to examine the role of supportive and transitional, high-expectation sheltered care environments in the development of residents' social networks. The influences of revolving-door treatment experiences, psychopathology, and institutionalization were taken into account. The results showed that supportive rather than transitional, high-expectation environments contributed to the development of emotionally and instrumentally supportive social networks. Higher levels of psychopathology and a history of institutionalization resulted in the absence of certain support relationships. Surprisingly, revolving-door treatment experiences were related to positive support and social network outcomes.

Shavit, Yossi, and Jennifer L. Pierce. 1991. Sibship size and educational attainment in nuclear and extended families: Arabs and Jews in Israel. American Sociological Review. 56(Jun):321-330.

We examine the relationship between number of siblings and educational attainment for three groups in Israel: Ashkenazi Jews, Oriental Jews, and Moslem Arabs. For both Jewish groups number of siblings has a nega-

tive effect on educational attainment. However, this pattern is not replicated for Moslems whose social organization is based largely on the extended family and the patrilineage (the hamula). Among Moslems the extended family plays an active supporting role vis-a-vis the nuclear family. While the size of the nuclear family does not affect educational attainment for Moslems in Israel, the size of the hamula does. This suggests that when the nuclear family draws on the support of an extended kinship, its size is less important for the educational attainment of children.

Shenk, Dena. 1991. Older rural women as recipients and providers of social support. Journal of Aging Studies 5(4):347-358.

The literature on serving the rural elderly has focused on rural elders primarily as passive recipients of care. This article views rural older women as active manipulators of the social support system within which they meet their perceived needs and the needs of others in their social network. It is based on the findings of a multi-phase qualitative study of 30 older women in central Minnesota. Data were collected through life history interviews, in-depth structured interviews, observation and network analysis profiles. The informants' relationships with family, friends, neighbors and formal service providers are discussed. Implications for formal service delivery to rural elders are explored.

Shioyama, Tadayoshi. 1991. Optimal control of a queuing network system with two types of customers. European Journal of Operational Research. 52:367-372.

We deal with an optimal control problem in a queuing network system. The system consists of the first stage with a server and the second stage with two servers each having its finite queue. Two types of customers are first served at the first stage server and subsequently proceed to the queue. Two types of customers are first served at the first stage server and subsequently proceed to the queue at the server corresponding to their types in the second stage. When the first stage server completes a service, he determines the type of customer to be next served. The optimal control problem is to select the type of customer to be next served in order to minimize the expected cost per hour. The problem is formulated as an undiscounted semi-Markov decision process. The monotonicity of the optimal policy is shown.

Shrum, Wesley. 1991. Critics and publics: cultural mediation in highbrow and popular performing arts. AJS 97(2):347-375.

That critics mediate the relationship between artworks and publics has often been suggested but never adequately tested. Cultural capital arguments lead to the expectation that the mediation process operates differently for highbrow and popular genres, while the idea of cultural convergence does not predict such an effect. Data on 624 shows and 1,204 primary reviews from the Edinburgh Festival Fringe are used to investigate the relationship between reviewers' evaluations and audience attendance. The results show that positive reviews are associated with greater audience participation, net of other factors, but the effect is limited to highbrow performance genres such as theater. Critics do not have the power to "make or break" shows. The visibility provided by reviews is more important than their evaluative function. The findings support the idea that the operative aesthetics in popular and highbrow genres are distinct, and critics are important only in the latter.

Shulman, Shmuel, Robert O. Fisch, Carol E. Zempel, Orit Gadish, and Pi-Nian Chang. 1991. Children with phenylketonuria: the interface of family and child functioning. Journal of Developmental and Behavioral Pediatrics 12(5):315-321.

Functioning and coping of 43 families with children with phenylketonuria (PKU) was investigated. A significant positive correlation was found among perceived family cohesion, dietary adherence associated with metabolic control, and child IQ. Parental education also significantly related to dietary adherence and to higher IQ level in the child. In addition, paternal perception of family adaptability was related to the child's IQ. Child depression as perceived by the parents was related to family fuctioning and coping variables. Functioning of PKU families is discussed in relation to current theories of family functioning under stress.

Silverstein, Merril, and Vern L. Bengtson. 1991. Do close parent-child relations reduce the mortality risk of older parents? Journal of Health and Social Behavior. 32(4):382-395.

This analysis examines the association between affectional solidarity in older parent-child relationships, and the parents' length of survival over a 14-year interval. It is hypothesized that close intergenerational relations have the capacity to reduce pathogenic stress among elderly parents, thereby enhancing their ability to survive. Direct and buffering effects of affectional solidarity, as expressed by 439 elderly parents, are tested using data from the U.S.C. Longitudinal Study of Generations collected between 1971 and 1985. Buffering effects are examined in the context of social decline and social loss experienced by the older parent. Hazard regression models indicate that greater intergenerational affect increases survival time among parents who experienced a loss in their social net-

work, particularly among those who were widowed less than five years. Neither a direct effect of affection nor a buffering effect in the presence of social decline were found. It is concluded that the mortal health risks associated with the stress of being widowed can be partially offset by affectionate relations with adult children.

Skvoretz, John. 1991. Theoretical and methodological models of networks and relations. Social Networks 13(3):275-300.

Biased net models developed to formalize Blau's macro-level distributional theory of social structure are extended to cover the micro-level analysis of intrapopulation variation in intergroup relations. The relational data analyzed are counts of relations (e.g., marriages, friendships) which are crossclassified by the social characteristics of the partners (e.g., occupation, religious preference). This theoretically based analytical approach is contrasted with a methodologically based one which uses general log-linear models to analyze the pattern of inter- and intragroup relations in such data. Both nominal and graduated dimensions of social differentiation are used in the comparison. Results indicate that, by and large, the theoretical approach offers a viable, and appropriately specialized alternative to the methodologically based analysis.

Skvoretz, John, and David Willer. 1991. Power in exchange networks: setting and structural variations. Social Psychology Quarterly. 54(3):224-238.

This article adds to the body of findings on how network position and the conditions of exchange influence an actor's power to obtain favorable outcomes. Four network structures of four persons each are examined in each of two experimental settings: a face-to-face setting, in which negotiations are carried out directly, and the ExNet setting, in which negotiations are carried out through a microcomputer-based electronic network. The structures are selected to provide further tests of the Markovsky et al.'s (1988) procedure for locating power positions. The different settings allow an assessment of the scope of their analysis. The results generally support their predictions. Also examined are two types of predictions, contingency and value, derived from the operant basis of Emerson's (1969) power-dependence theory. The contingency predictions receive more support than do the value predictions.

Smith, J. MacGregor. 1991. State-dependent queuing models in emergency evacuation networks. Transportation Research. Part B—Methodological 25B(6):373-389.

Planning and design of evacuation networks is both a complex and critically important problem for a number of emergency situations. One particularly critical class of examples concerns the emergency evacuation of chemical plants, high-rise buildings, and naval vessels due to fire, explosion or other emergency. The problem is a highly transient, stochastic, nonlinear, integer programming problem and previous methodologies utilizing queuing network models have proved useful in the design of emergency evacuation plans. We enhance this class of queuing network models by adding state-dependent queuing models to capture the nonlinear effects of increased occupant traffic flow along emergency evacuation routes. A mean value analysis algorithm and computational experience of the methodology illustrates our model's usefulness for this class of network design problems.

Smith, Martin J. 1991. From policy community to issue network: salmonella in eggs and the new politics of food. Public Administration. 69(sum):235-255.

In the last two years the issue of food has been subject to increasing political controversy with firstly salmonella in eggs and later listeria and BSE becoming the focus of conflict and widespread media attention. This is an important change. In most of the post-war period food policy was conducted within a relatively closed policy community where issues concerning food policy were largely treated as routine technical decisions. The significance of the salmonella in eggs affair is that it is indicative of wider changes in the making of food policy. The increased activity of interest groups, the impact of the Common Agricultural Policy and changes in the retail economy have combined to transform the food policy community into an issue network.

Solomon, Charlene Marmer. 1991. Networks empower employees. Personnel Journal. 70(10):51-54.

Through employee networks, diverse groups are taking control of their professional development and sharing their perspectives.

Sparrow, Malcolm K. 1991. The application of network analysis to criminal intelligence: an assessment of the prospects. Social Networks 13(3):251-274.

This paper explores the opportunities for the application of network analytic techniques to the problems of criminal intelligence analysis, paying particular attention to the identification of vulnerabilities in different types of criminal organization - from terrorist groups to narcotics supply networks. A variety of concepts from the network analysis literature are considered in terms of the promise they hold for helping law enforcement agencies extract useful information from existing collection of link data. For example, six different notions of "centrality" and the

three major notions of "equivalence" are examined for their relevance in revealing the mechanics and vulnerabilities of criminal enterprises.

Steene, Anders. 1991. Personal network as a business strategy. Annals of Tourism Research 18(4):666-668.

This research note is based on several projects investigated by the tourism Management Programme (TMP) at Kalmar University College for various tourism enterprises and organizations. It reports on why there is so little cooperation in the tourist industry and puts forward suggestions as to how cooperation can be improved in the future. This investigation was a pilot study of firms and organizations in the province of Kalmar, Sweden. Data was collected through interviews with different representatives of enterprises and organizations.

Stuen, Cynthia. 1991. Awareness of resources for visually impaired older adults among the aging network. Journal of Gerontological Social Work 17(3-4):165-179.

Approximately 13%of the older adult population have severe near, intermediate and/or distance vision impairment. However, there is little recognition within the aging network that vision impairment among older adults can lead to isolation and excess disability. This article reports on a survey conducted by the Lighthouse National Center for Vision and Aging of the State Units on Aging (SUA) and Area Agencies on Aging (AAA) to assess their awareness of the vision rehabilitation network of services, their perceived need for more information on age-related vision loss and to identify specific projects known to or within the aging network addressing the needs of visually impaired older adults. Among the 298 respondent AAAs, 74% could identify at least one resource for visually impaired people, usually a segregated service offered exclusively to blind/visually impaired older adults. Eighty-three percent of the AAA respondents felt they needed to have more information on age-related vision impairment. The sparsity of programs within the aging network to address needs of visually impaired older persons is documented and discussed.

Sutton, John R. 1991. The political economy of madness: the expansion of the asylum in progressive America. American Sociological Review 56:665-678.

In the United States between 1880 and the 1920s, unprecedented numbers of people were confined in mental hospitals, leading many contemporary observers to conclude that the nation was experiencing an epidemic of madness. I analyze the expansion of asylums as a product of organizational and political forces rather than an increase in insanity. The analysis is based on Grob's (1983) historical argument that asylums were forced to absorb increasing numbers of the aged poor who could no longer be confined in almshouses. This analysis is supplemented by a more comprehensive model that treats political factors - especially the fiscal capacities of state governments and the role of political parties - as fundamental determinants of institutional policy. This model is tested using longitudinal quantitative data for U.S. states. Results confirm the direct effects of almshouse capacities in an attenuated way, and show further that political organization influenced the production of insanity.

Swedberg, Richard. 1990. International financial networks and institutions. Current Sociology 38(2-3):259-281.

The author defines international financial institutions (IFIs) as official international financial organizations and claims that 'international financial networks' is a broader topic and has a much longer history. The chapter has two major tasks: (1) reviewing literature on both IFIs and international financial networks, and (2) outlining how international financial networks can be studied.

Tallman, Irving, Louis Gray, and Robert K. Leik. 1991. Decisions, dependency and commitment: an exchange based theory of group formation. Advances in Group Processes 8:227-257.

This paper uses the Satisfaction Balance Decision Model and a slightly modified version of Emerson's notion of dependency to develop a theory of how groups are formed in exchange networks. It is suggested that group formations alter the patterns of exchange within networks by lowering the costs of exchanges for group members and increasing costs for non-group members. Two axioms and ten theorems are provided to explain how actors move from casual interactions to committed relationships to forming groups. Embedded in this process is a set of antecedent conditions that are hypothesized to change an actor's orientation from seeking self-satisfactions to focusing on group payoffs and group viability – even when costly or damaging to the self. The theory also provides a set of 12 scope conditions identifying its domain of generalizability and the initial conditons under which it can be tested.

Terry, Deborah J. 1991. Stress, coping and adaptation to new parenthood. Journal of Social and Personal Relationships 8:527-547.

A longitudinal study of 123 couples provided some support for the utility of a model of adaptation to parenthood. Even when the effects of initial well-being were controlled, the level of subjective stress (strain) and the use of tension-reducing coping strategies emerged as (negative) predictors of contemporaneous and delayed measures

of adaptation. This support for the model was also evident when an external measure of adaptation was utilized. There was, additionally, support for the proposal that problem-focused coping facilitates adaptation to new parenthood, although 18 weeks after the birth this effect was evident only for males. In relation to coping resources, the data provided some support for the proposed effects of the individual resources (self-esteem, internality) and both marital and family support. Non-family support was not related to any of the measures of adaptation. There was some evidence that females experienced lower levels of psychological well-being in the immediate postnatal period than males, while males rated their partner's coping effectiveness more poorly than females. In addition to the gender difference in the effects of problem-focused coping, there was also evidence to suggest that the effects of internality on adaptation 4 weeks after the event differed for males and females.

Tharp, Roland G. 1991. Cultural diversity and treatment of children. Journal of consulting and Clinical Psychology 59(6):799-812.

The increasing cultural diversity of child clients has produced a cascade of new issues and concerns for psychological practice, theory, and research. Available evidence and pertinent theory are reviewed on such topics as the predictive utility and treatment consequences of ethnic membership, whether treatments should be generic or specific to cultural groups, the degree of privilege that should be accorded to same-culture therapists, and the relative desirability of different modalities of treatment for children of different cultural groups. The concept of cultural compatibility of treatment is explored and evaluated. A broad agenda of hypotheses for research and development is suggested, and some guidelines for clinical practice and policy are proposed. It is concluded that insofar as possible, treatment for all children should be contextualized in their family's and community's structure of meanings, relationships, and language.

Thornicroft, Graham, and William R. Breakey. 1991. The COSTAR programme .1. Improving Social Networks of the Long-term Mentally-ill. British Journal of Psychiatry 159(Aug):245-249.

The present study examined the socio-demographic, clinical, cognitive, social behavior, and social network characteristics of the 97 patients in contact with the COSTAR programme—a mobile treatment and case management service for the long-term mentally ill in inner-city Baltimore. Compared with shorter-contact patients, those in contact for more than one year showed no change in symptoms, or in cognitive or global function. They did manifest improved social function, especially for slowness, personal hygiene and posturing. The long-contact group showed improvements in the quality and quantity of their social networks. Our results suggest that a home-based treatment system can help patients to reverse a vicious cycle of social isolation and to establish supportive social contacts.

Torres, Cruz C., Mary Zey, and Wm. Alex McIntosh. 1991. Effectiveness in voluntary organizations: an empirical assessment. Sociological Focus. 24(3):157-158.

In the tradition of Knoke and Wood (1981) the effects of resources mobilization, employee commitment, and bureaucratization on the effectiveness of voluntary organizations were explored. The respondents consisted of ninety-five percent of the volunteers and all the administrators of a food distribution center and its satellites in the most economically depressed area of Texas. It was found that organizational effectiveness is a result of commitment (involvement). Effective service to the client is increased by member autonomy and participation in decision making, by identification with and loyalty to the organization, and by resource mobilization. As autonomy, participation in decision-making, involvement, and resource mobilization decline, unmet needs of clients increase.

Turner, W.A., and F. Rojouan. 1991. Evaluating input/output relationships in a regional research network using co-word analysis. Scientometrics. 22(1):139-154.

In this study, a network management approach to science policy decision-making guided our efforts to develop new co-word analysis techniques for the evaluation of regional research policies. A rich collection of factual data was gathered on the inputs into the local research system (funding, personnel, equipment,...). This data was then combined with the results of a co-word analysis of the region's publication output. The network management approach is useful in helping to determine the nature of input/output relationships in a regional context.

Tyre, Marcie J.1991. Managing the introduction of new process technology: international differences in a multiplant network. Research Policy. 20:57-76.

This paper examines the introduction of new technologies in the manufacturing environment, and addresses two central questions. First, how can factories introducing new process technology deal with change rapidly and effectively? Further, what fundamental organizational changes are necessary to enable plants to respond successfully to the challenge of technological change? The research examined 48 projects where new manufacturing technologies were introduced. Projects were undertaken in plants in Italy, West Germany, and the United States which

belong to a single company. In comparing success across regions, performance measured by startup time and operating improvement was significantly lower in the U.S. plants than in European operations. A significant portion of this performance gap can be explained by differences in the way project teams in each region used available mechanisms for identifying and solving the problems associated with new technologies. U.S. project teams were, on average, less likely than those in Europe to engage in preparatory problem-solving activities, or to solve problems by working with external technical experts, or by merging different functional perspectives within the project group. To understand the source of these differences, the paper examines historical and organizational differences among the operations in different geographic regions. Over time, local managerial choices had resulted in distinct sets of organizational capabilities, resources, and assumptions that affected the way plants in different regions approached technological problem solving. The paper argues, therefore, that such managerial choices constitute important strategic decisions which have long-lived implications for technological innovation in the manufacturing environment.

Veiel, Hans O.F., and Johannes Herrle. 1991. Geschlechtsspezifische strukturen sozialer unterstutzungsnetzwerke. Zeitschift fur Soziologie. 20(3):237-245.

Zusammenfassung: Geschlechterunterschiede in der struktur und Zusammensetzung individueller unterstutzungsnetzwerke wurden in drei verschiedenen Stichproben untersucht: Studenten (N=63), entlassene depressive Patienten (N=81) und Eltern krebskranker Kinder (N=114). Die Verwandten- und Bekanntennetzwerke von Mannern und Frauen wurden hinsichtlich Grobe, Geschlechterverhaltnis, Alter und Multiplexitat der Unterstutzungs-funktionen verglichen. In allen drei Stichproben bestand sowohl bei Mannern als auch bei Frauen eine ausgepragte Tendenz zu gleichgeschlechtlichen Netzwerken. Insgesamt enthielten die Netzwerke mehr Frauen als Manner. Ansonsten wurden allenfalls marginale Geschlechterunterschiede gefunden. Signifikante Unterschiede zeigten sich auch in der Zusammensetzung von Verwandten- und Bekanntennetzwerken.

Veiel, H.O.F., M. Crisand, H. Stroszeck-Somschor, and J. Herrle. 1991. Social support networks of chronically strained couples:similarity and overlap. Journal of Social and Personal Relationships. 8:279-292.

The structure and composition of social support networks were examined in a sample of fifty-seven chronically strained couples. Data were collected with structured interviews and arranged in 'support matrices' of network members by support functions, and each network member was individually tagged. Scores representing the size of the overall support networks and the number of support providers in specific functional categories were computed separately for relatives and for friends/acquaintances. Principal component analysis (PCA) with couples as 'cases' was used to evaluate common and individual determinants of support networks. In addition, for all categories of support providers the actual overlap between wives' and husbands' networks was computed.

Wagner, Katharine, G., and Lawrence G. Calhoun. 1991-92. Perceptions of social support by suicide survivors and their social networks. Omega 24(1):61-73.

Current research tentatively suggests that families bereaved by suicide may receive and experience low levels of support. It is not clear, given the available data, whether there is a difference in the support given or in the support received, because no studies have systematically compared survivors with their social networks. Two groups participated in this investigation: survivors of a suicide in the family and members of their support systems. Each group completed objective scales of the social support that was offered or received by the members of the family as well as a scale of recovery from grief, and all participants were interviewed. Statistical analyses of the quantitative data indicated no differences between the groups, with the exception of a marginal trend suggesting survivors were rated less recovered by themselves than by members of their support systems. However, analysis of the qualitative data indicated that survivors believed that only other suicide survivors could fully understand them, and that they experienced implicit pressure from others to "recover" from their loss.

Wallace, Rodrick. 1991. Traveling waves of HIV infection on a low dimensional 'socio-geographic' network. Social Science Medicine. 32(7):847-852.

Observation of an essentially linear growth in time of U.S. and New York City AIDS cases, from about 1984 through early 1988, is shown to imply a relatively constant rate of transmission of HIV transmission within geographically constrained social networks, leads to inference that a constant rate of HIV transmission, in turn, implies a 'surface growth' phenomenon resulting in a traveling wave of infection advancing at a fixed 'velocity' along a 'one dimensional socio-geographic network.' Implications of this view are discussed for both data collection and analysis, and for intervention. Differences for the processes of disease transmission and control, based on the relative stability of socio-geographic networks, are postulated between the ghettoes of the middle-class male homosexual community and the physically devastated and socially disintegrated ghettoes of the minority urban poor.

Wellman, Barry, Ove Frank, Vicente Espinoza, Staffan Lundquist, and Craig Wilson. 1991. Integrating individual, relational and structural analysis. Social Networks 13(3):223-249.

The first part of this paper presents a statistical model which integrates individual, relational and network data, despite their different units of analysis. The model uses a stepwise approach to find the least number of parameters which adequately fit the data. The second part of this paper uses this model to analyze how the marital status of Torontonians is related to the kinship composition and social density of their intimate networks. It shows that kinship and friendship usually comprise independent social circles within these networks. The larger networks of married respondents tend to contain a higher proportion of kin, and consequently, to be more densely-knit. Yet single respondents tend to have more densely-knit clusters of intimates within their friendship-based networks. This is because marriage rarely joins the intimates of spouses.

Wenger, G. Clare. 1991. A network typology: from theory to practice. Journal of aging studies. 5(2):147-162.

Based on a longitudinal study of aging in rural communities in North Wales, the article describes the development of a typology of the informal support networks of elderly people based on qualitative data from an intensive study and subsequent operationalization for use in a large sample longitudinal survey (N = 534 at T1). Relationships with demographic variables and service are described and policy implications identified. Network type was found to be highly predictive of service use and availability of informal support. The development of the typology as a practice tool for workers in community care is discussed.

Wissema, J. G., and L. Euser. 1991. Successful innovation through inter-company networks. Long Range Planning 24(6):33-39.

Companies are now investing in the new technologies of the 1990s. This article deals with the central question of why and how companies work together on technological innovation. First the authors look at the reality of technological innovation, and review reasons why companies might want to work together in this area. They then uncover the different types of collaboration involved in technological innovation. These forms are innovation networks, and they identify several success factors for innovation networks.

Witten, Ian H., Harold W. Thimbleby, George Coulouris, and Saul Greenberg. 1991. Liveware: a new approach to sharing data in social networks. Journal of Man-Machine Studies 34:337-348.

While most schemes that support information sharing on computers rely on formal protocols, in practice much cooperative work takes place using informal means of communication, even chance encounters. This paper proposes a new method of enabling information sharing in loosely-coupled socially-organized systems, typically involving personal rather than institutional computers and lacking the network infrastructure that is generally taken for granted in distributed computing. It is based on the idea of arranging for information transmission to take place as an unobtrusive side-effect of interpersonal communication. Update conflicts are avoided by an information ownership scheme. Under mild assumptions, we show how the distributed database satisfies the property of observational consistency. The new idea, called "Liveware", is not so much a specific piece of technology as a fresh perspective on information sharing that stimulates new ways of solving old problems. Being general, it transcends particular distribution technologies. A prototype database, implemented in HyperCard and taking the form of an electronic directory, utilizes the medium of floppy disk to spread information in a (benign!) virus-like manner.

Yamagishi, Toshio, and Karen S. Cook. 1990. Power relations in exchange networks. A comment on "Network Exchange Theory". American Sociological Review 55(2):297-300.

While achnowledging many points of overlap with Markovski, Willer and Patton (ASR, 1988), the authors point out some significant differences between the two approaches. They argue that Markovsky, Willer and Patton (MWP henceforward) use a measure of power that is not general enough, does not clearly articulate the bases of some axioms, use methodological procedures inconsistent with the theory, and overstate the uniqueness of their theory. Examples provide details of the problems the authors see in the MWP theoretical approach.

Zahn, Lawrence G. 1991. Face-to-face communication in an office setting: the effects of position, proximity, and exposure. Communication Research 18(6):737-754.

The effects of hierarchical relationships and physical arrangements on face-to-face communication in an office environment were investigated. Mutual exposure, physical distance between offices, chain-of-command distance, and status distance were compared as predictors of communication time. A path model was developed using exposure as a mediating variable between the distance measures and communication time. Exposure was a sufficient predictor of communication. Chain of command, status, and office distance all related to exposure, with chain-of-command distance having the strongest association with exposure. Distance between offices was primarily associated with chain-of-command distance, with status distance having a smaller but significant effect. Results suggest ways in which organizations might manage exposure in order to influence face-to-face communications.

ABSTRACTS: CHAPTERS IN BOOKS

Hummel, Hans J., and Wolfgang Sodeur. 1990. Evaluating models of change in triadic sociometric structures. In Jereon Weesie and Hank Flap, eds. Social Networks Through Time. Pp. 281ff. Utrecht, Holland: ISOR.

This contribution reports our work in defining and applying an appropriate strategy for testing theories of structural balance and/or intransitivity. During different phases of our conceptual efforts we applied our ideas to the analysis of change of networks of social relations, especially preference relations, among individuals. We began by using panel data gathered over 9 weeks on a developing network of social relations among some 180 students at a German university (Hummel and Sodeur 1984). Later, we turned to Newcomb's data (Nordie 1958, Newcomb 1961).

Levitt, Mary J.1991. Attachment and close relationships: a life-span perspective. In Jacob L. Gewirtz and William M. Kurtines, eds. Intersections with Attachment. Pp. 183-?. Hillsdale, NJ:Lawrence Erlbaum Assoc.

Intersections of infant attachment theory with models of close relationships and social support in adulthood are proposed within the framework of the social convoy model elaborated by Kahn and Antonucci (1980). Close relationships across the life span are viewed as continuations of early attachment relations, governed by similar processes and serving similar functions. The primary process is hypothesized to be the establishment and maintenance of relationship expectations, forged through familiarity with relationship partners and mutuallly contingent feedback, and influenced by cultural norms and past relationship experiences. Relationships are thought to be stabilized and given continuity through mutual adaptation to partner expectations, modulation of conflict, and maintenance of behavior within the limits of partner tolerance. Developmental changes in existing relationships and structural changes over the life course in the individual's circle of close relationships are thought to ensue from changes in cognitive ability, individual maturation, and age-related social norms. Changes in the ability to modulate conflict may also play a role in the evolution of relationships. Consistent with an attachment mode, personal well-being is hypothesized to be related primarily to close relationships rather than to support networks as a whole, and data are cited to suggest that one such relationship may be sufficient.

O'Malley, Pat. 1991. Legal networks and domestic security. In Studies in Law, Politics, and Society. Vol. II. Pp. 171-190. Greenwich, CT. and London: JAI Press Inc.

O'Malley deals with issues regarding the legal system and the notion that "state power is being dispersed from coercive, formal state agencies to an expanding 'soft' periphery of less formal, ostensibly less coercive nonstate control agencies," and with the view that with increasing autonomous fields or relations the state is not necessarily the central control but merely one aspect.

Rotenberg, Ken J.. 1991. The Trust-Value Basis of Children's Friendship. In Ken J. Rotenberg, ed. Children's International Trust. Pp. 160-172. New York: Springer-Verlag.

In this chapter Rotenberg discusses the importance of friendship and trust in children's relationships. Children's books and magazines whose themes are secret and promise keeping are given as examples of how "children's friendships are affected by secret sharing, secret keeping, promise fulfillment, and the underlying perceptions of trust and attributions of trustworthiness". Rotenberg's research reveals differences between children's and adult's trust. He considers the role that parental practices play in developing children's beliefs and practices, and the affect that lying and deception have on children's friendships.

Smith, Gavin. 1989. Class Consciousness and culture. In Gavin Smith Livelihood and Resistance: Peasants and the Politics of Land in Peru. Pp. 218-236. Berkeley, CA: University of California Press.

Smith utilizes the concepts of class consciousness and culture in his critical analysis of the political circumstances surround Peruvian highland peasants, particularly the Huasicanchinos. He attempts to broadly consider the past experiences of the Huasicanchinos in order to understand their history, self-identity, and their experiences of work and guerrilla fighting. The political situation of the Huasicanchinos must, feels Smith, be viewed in the context of class and cultural conditions.

ABSTRACTS: PAPERS PRESENTED

Allison, Paul D. 1991. Cultural relatedness under oblique and horizontal transmission rules. University of Pennsylvania.

The concept of genetic relatedness is central to the sociobiological theory of kinship altruism. Genes which code for altruistic acts toward closely related genetic kin can overcome selection pressures favoring self-interested behavior. But genetic relatedness declines rapidly as kinship becomes more distant, thereby restricting genetically-based altruism to very close kin. This paper extends these notions to cultural relatedness, arguing that oblique and horizontal transmission can yield high levels of cultural relatedness in larger groups. A mathematical model of cultural transmission is proposed, and equilibria for several special cases are investigated. For all models, the equilibrium level of relatedness is critically dependent on the influence of exogenous sources. In models with equal influence of nonparents, the level of relatedness varies inversely with group size. On the other hand, when nonparental influence is concentrated on a single individual, the level of relatedness does not vary with group size.

Call, Vaughn R. A. 1990. Respondent cooperation and requests for contacts in longitudinal research. Center for Demography and Ecology. University of Wisconsin-Madison.

Researchers contemplating panel research designs continue to face limited information on ways to reduce panel attrition. A common theme in the extant literature is the importance of the amount and type of information available to researchers to locate respondents who move. Data from the 1988 National Survey of Families and Households (N = 13,017) are used to examine the extent of respondent cooperation to requests for the names and addresses of friends and relatives who might help researchers locate panel members who move and the antecedents of that cooperation. Taking respondents' social characteristics and likelihood to refuse participation into account, respondents with limited family networks are less likely to provide three contacts than are people with large family networks. Divorced, never married, and minority respondents are less likely to provide three contacts. The findings suggest that researchers can decrease panel attrition by training interviewers to recognize the factors that limit the number of contacts and by providing interviewers strategies for coping with these factors.

Gurd, Geoffrey. 1991. Information technology in hospitals: tasks and organizational couplings. Department of Communication. University of Montreal. Presented at the International Communication Associations's annual convention. Chicago, IL.

This paper addresses the dilemmas that are arising with the mounting usage of computer information systems in health delivery environments. Gurd discusses the failure of computing systems, as one example, by those who reject or underutilize them. By using K. Weick's notion of coupling to emphasize changes in the variability of the coupling relations in organizations, Gurd argues that it is possible to understand the contingent nature of the organizational consequences of computerized information systems.

Laumann, Edward O., John H. Gagnon, Stuart Michaels, Robert T. Michael, and L. Philip Schumm. 1991. Monitoring AIDS and other rare population events: a network approach. Presented at the Sunbelt Conference of the International Network for Social Network Analysis. Tampa, FL.

This paper replicates and extends an earlier attempt to use data from the General Social Survey (GSS) on whether respondents know a person with AIDS (PWA) to track the distribution of the disease across demographic subgroups. The gender, racial, age, and regional compostition of the set of PWAs reported by GSS respondents is compared with that of the official AIDS cases reported to the CDC. A similar analysis is performed with homicide victims known to GSS respondents, in an attempt to assess the accuracy of the GSS estimates. Data from four consecutive GSS samples (1988, 1989, 1990, and 1991) are used, permitting a more detailed exploration into potential biases and problems with the network technique. In addition, time series data from the National Health Interview Survey on the percentage of people who know at least one PWA are used to validate the GSS data and to introduce a possible method for monitoring the relative prevalence of AIDS across subgroups when information about the relevant characteristics of PWAs was not collected. Our earlier findings, that the GSS identifies proportionately more White and midwestern cases than are reported to the CDC, are corroborated by the additional

data. Possible explanations for these discrepancies are given, and suggestions are made for improving the utility of the approach.

MacDonald, Maurice M. 1989. Family background, the life cycle, and inter-household transfers. School of Family Resources and Consumer Sciences. University of Wisconsin-Madison.

The main findings in this paper can be divided into three parts. These are patterns of inter-transfers with respect to household type, age, family relationships, the reasons reported for the largest gifts and loans, and correlates with education, race, and household income. Averages for various types of household income and income in total are then compared to corresponding estimates of average inter-transfer amounts within broad age groups.The third section of the paper addresses some questions about family motives for inter-transfers with a Multiple Classification Analysis of the effects of gender, birth-order, family size, and other background characteristics on amounts of gifts and loans, first home aid, and inheritances. The fourth section discusses the determinants of gifts and loans further, to illustrate the relative impacts of various life-course events, such as marriage, divorce, and spells of nonemployment. The findings for the percentages that receive these transfers are also compared to the results of a parallel analysis of public assistance recipients. Issues for next steps are addressed in the last part of the paper.

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PRINCIPAL DISCIPLINARY AFFILIATION (What field is your "home?") administration anthropology biology communications community/urban computing criminology demography economics education epidemiology geography gerontology history information law library management/business math medicine networking planning politics psychiatry psychology public_health social_work sociology statistics theology other _____

KEYWORD DESCRIPTORS OF ACTIVE INTERESTS: administration AIDS/HIV attitudes authority block business centrality change children class cluster cognition community computer conflict consulting corporation crime culture demography deviance economy education elites entrepreneurship environment epidemiology ethnicity exchange family fieldwork friendship gender gerontology global government graphs group health hierarchy history households information kinship labor law longitudinal market mental-health methods microstructure migration mobility modeling occupations organization perceptions person politics power profession recruitment religion rural science small-group social-movement social-support stratification survey teaching technology teenage theory therapy urban women
Other_____

CURRENT NETWORK ACTIVITY (What are you up to? Include recent publications)

_____

_____

_____

_____

Please send abstracts of recent papers and books.

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