

# C O N N E C T I O N S

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# CONNECTIONS

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CONTRIBUTIONS 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.

## FROM THE NEW EDITORS

*Alvin Wolfe.*

Having now received from Barry Wellman many boxes and packages of files and papers and disks as well as a number of electronic messages via BITNET, I am even more impressed than I was previously with all that he did over the years in creating CONNECTIONS and INSNA. I will do my best to maintain the business side of INSNA, and, as you can see in this issue, Susan Greenbaum is doing a good job of maintaining CONNECTIONS as the useful newsletter we all need.

We will not attempt to change anything in 1988, having taken over at midyear and mid-volume, so to speak. Hopefully, the advisory boards that already exist will continue to function. In time, we hope that INSNA will be sufficiently organized to serve us all better by way of organizing conferences and workshops in addition to the Sun Belt Social Network Conference.

Even the SBSNC might benefit from closer affiliation with INSNA, because each year we run the risk that the volunteer organizers might not get all the arrangements made in time, get all the announcement out in time, etc. It looks like we'll be all right for February 1989. Jeff Johnson is putting out announcements for the Conference at the very location where the first two were held in 1981 and 1982, the Bay Harbor Inn in Tampa. Please help Jeff get the word out to everybody, and don't forget to get your own abstract in to him at East Carolina University, Greenville, N.C. 27834.

We will be trying to improve the services of INSNA, but in order to get the resources to do that, we will have to increase our membership somewhat. I am making arrangements with other organizations to exchange advertisements in journals and newsletters. If any of you Connections readers can put me in touch with likely prospects for such exchange, it would help a lot. Also, I would appreciate access to any lists that you might have of potential INSNA members. Remember, INSNA is intended for all disciplines, for all kinds of practitioners and theorists. Anyone whose work involves connections, relations, linkages, bonds or ties will benefit. I ask each of you to put us in touch with your contacts and to link them with us.

Thanks for your help.

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*Susan Greenbaum*

There is little that I need to add to Al's above remarks. The transition in editorship has been a halting process, accounting for the delay between the past issue and this one. Hopefully, we will soon be back on schedule, now that we have marshalled some good student volunteers and a paid grad assistant to facilitate the staggering amount of organizational scut work required to get an issue to press. Many thanks to Barry for supplying me with an abundant stock of articles, abstracts, notices, and tid bits, not to mention his fine column, all of which were crucial to the launching of the South Florida CONNECTIONS operation.

The pantry is pretty well depleted, however. I would greatly appreciate added submissions of articles, announcements, or whatever. For anything longer than four double-spaced pages, please send me a disk, along with the manuscript, either as an ASCII file, or preferably in WORDSTAR. Neither our software, nor this editor, is sufficiently comprehensive or flexible to deal with other systems.

Suggestions about modifications, or new slants, are also most welcome.

# TIES AND BONDS

*Barry Wellman*

## Garlic Network

A new tale of networks in ancient Babylon, 6th century BC: "The business-man hero of the tale is Iddin-Marduk, who ran a sizable family business for 78 years,....a mixture of silver loan operations (at rates typically ranging around 20%), passive investing in entrepreneurial ventures (with required returns here around 40%), & importing & exporting produce, especially garlic. The produce operation was sustained by a network of salaried business agents, who both acquired the garlic & arranged to sell it. A lot of the company's sales were made on credit, & a large fraction of the period's cuneiform tablets seem to have been promissory notes."

[Fortune Magazine, 25 April 1988: an account of the PhD thesis of Laurence Schiff, Near Eastern Studies, Toronto]

## Info Flows

Bruce Mayhew (Soc, S Carolina) died 3/88 from cancer after a long illness....Nicholas Mullins died 7/88 from complications of lymphatic cancer after a long illness....Brian Foster to Academic VP of Arizona St....Linda Molm to Soc, Arizona....Ivan Szelenyi to Soc, UCLA....Wendy Griswold tenured at Chicago....Winnie Lem & Gavin Smith (Anthro, Toronto) married; Gavin's become Assoc Dean of Arts & Sciences....Rosabeth Moss Kantor (Harvard Bus Schl) reportedly a key advisor to Michael Dukakis....Claude Fischer (Soc, Cal-Berkley) elected head of Community section, Amer Soc Assoc....Frans Stokman has returned to Groningen after a year's sabbatical in Michigan....A Toronto "escort" service (i.e., sensual relationships for hire) is called "Kosher Nostra". Never on Saturday, but twice on Sunday?....Joe Galaskiewicz (Soc, Minnesota) gave a Parisian seminar 15 June 88 to AFARS, L'Association Francaise des Analystes de Reseaux Sociaux en route between China & USA AFARS' announcement says the discussion will be in "americano-francais"....New Society died 27 May 88, after a distinguished career of bringing social science scholarship to a broad intellectual audience (& having wandered around in ultra-left circles for much of the past decade). It's merged into the New Statesman.

## And What Is the Meaning of 'reseaux'?

The literal translation of "social networks" in Hungarian is "human contact" -- says INSNA member Endre Sik.

## What Thatcher's Cutbacks Have Wrought

Scholar expressed surprise that Oxford poetry prof Peter Levi hadn't gone to the California archives to check the original manuscript when he claimed to have discovered a new poem by Shakespeare. The head of the Huntington Library, Daniel Woodward, said "It does seem odd that he would publish the results of his research before he had done his research." Levi explained: "I can't afford to jump on a plane to California. I'm a professor of poetry." [NY Times-26 April 88].

## I Guess We Should Be Flattered, But...

For possibly the first time (but probably not the last time), one sociology dept has rejected a candidate on the grounds that they had "too many network analysts."

## Letter From Mississauga

[Conference on the "Political Economy of the Margins," May 27-28, Erindale Col, U of Toronto; Organizers: Harriet Friedmann (Soc, Toronto), Gavin Smith (Anthro, Toronto), Teodor Shanin (Soci, Manchester)]

This unstructured (lots of talk; few papers) conference's theme focused on two related subjects:

- a) People who live "on the margins" such as those in the Hungarian "third economy" or the poor migrants who've come to African cities. How do they survive? What exchanges do they make among themselves and with the formal sectors of the state and the economy? What prospects for political organization are there among such groups?
- b) Informal relations among better-established people, that is the kinds of informal (or marginal) exchanges of services and social support exchanged world-wide among kin (and sometimes) friends and neighbours. We all wondered how important such exchanges are -- for households and for society as a whole -- and whether treating them as "marginal" (that is, on-the-side, residual, not central) implicitly gives the advantage to the bureaucrats and economists who take formal structures so seriously. Shanin's paper on "expoliary economies" set much of the tone of the subject, bolstered by the participants' widespread interest in the rapid changes occurring in Eastern Europe. His area of expertise is the peasantry. He argued that small farms have always been more just, more flexible -- and even more efficient -- than large corporate farms. Shanin is working with Soviet colleagues to publish the work of Chanov, a 1930s thinker on this subject who died in the purges. Shanin asserted that the lack of efficiency of Chinese peasants in the 1950s-1970s kept the rural economy going. If there had been great efficiency, the centralizers would have starved the countryside as so much of the food went to the city. However, in rural areas, the peasants, warehouse people, transport workers, and low-level cadres all took care of themselves, their kin and their friends. The result was that the countryside had enough food.

The conference identified four levels of analysis:

- 1) How marginal activities are integrated into the larger system.
- 2) How marginal activities are structure in their own right, as systems of social relations; e.g., kinship groups or work cooperatives.
- 3) Individual and household strategies of survival.
- 4) As a special case of (3), gender relations, especially in the household.

Just as in the study of the community, analyses of the informal economy have gone past worrying that informal marginal activities will wither away under the onslaught of powerful bureaucratic structures. Yet, analysts have often been content to identify the mere survival of informal activities. I argued that "marginal" really is central. We should not let the believers in the central authorities (whether state or corporate) set the terms of the debate. Indeed, informal exchanges are fundamentally necessary for the ongoing operation of formal organizations and society itself. They are the way we all make flexible deals to survive -- whether peasant or top organizational managers.

We discussed the different nature of informal activities in Latin American and Eastern European countries. In each case, the informal activity is the counterbalance to the nature of the forces of the formal organs. Thus in Latin America there is much informal collective work with strong political components. In Eastern Europe, informal activity seems to be more self/household centered and for private economic advantage. (Yet as Shanin pointed out, almost all Russian refuseniks have survived without jobs because of support from kin, friends, and former co-workers.)

One major unresolved debate is whether these groups can be the basis for more political restructuring. The Latin Americans are more optimistic about grass roots political mobilization than the other conference participants, with the Eastern Europeans being the most pessimistic.

Some general differences between informal and formal work relations were suggested:

- Use value is often as important as exchange value.
- Satisfaction is as important as production.
- People enjoy the social relationships involved in production.
- Instead of monetary exchange wages, there is reciprocal exchange over time.
- The household is the basic unit for the organization of production.
- There is little desire for the group to grow in size.

- Social relations are more important than economic.
- Informal organization makes such groups harder to tax or regulate
- Labour input is often more important than capital or goods input
- The unregulated nature of the informal economy ambivalently offers more scope to oppress women but more opportunity for women to manipulate the household economy

### Visit Beautiful San Francisco

Melvin Oliver (Soc, UCLA) is organizing a social networks session for the 1989 American Sociological Assn annual meetings (8/89 in SF). He wants to focus on "how network analysis contributes to our understanding of substantive questions, such as community, social mobility, etc." If interested, contact him ASAP.

### Markets & Networks (cont'd)

In SOCIAL STRUCTURES (Wellman & Berkovitz 1988) my favourite author wrote (pp. 221-22):

"Consider...how puzzled North American economists and business people have been about the West's failure to penetrate Japanese markets. Their explanations have usually been 'culturally based,' in the broadest and loosest sense. The Japanese, they argue, xenophobically reject foreign businesses, or Japanese business people 'know how to cooperate' better than the Westerners. These interpretations take as their normative baseline the Western myth that markets consist of dyadic exchanges between buyers and sellers operating at arm's length. They regard the so-called 'free market' as normal -- and hence, in little need of further explanation -- and treat Japanese imperfect competition as an aberration that demands explanation for its stubborn persistence.... To be sure, Western economists sometimes recognize long-lasting business relationships. But they treat these as special cases -- as attempts to limit the effects of, or undermine, market forces. In contrast, structural analysts see the establishment of a set of social relationships among firms as an intrinsic part of the formatin of concrete markets. Viewed from this vantage point, what needs to be explained in the Japanese case is not the persistence of dense economic ties that are resistant to foreign intrusion, but why an enterprise would cut itself loose from the established networks within which it operates in order to gain short-lived benefits from transactions with a structurally isolated Western business."

*Exam Question 1:* What then do you make of current behavior, reported in the FINANCIAL TIMES (9 June 88) under the headline "Call for Japan Chip Sanctions:"

"[One element in the 1986 US/Japan Semiconductor Trade Agreement] was Japan's agreement to open its market. According to the US, this included a commitment to increase the foreign share of the market to 20% by 1991....[Recently,] the US delegation was willing to drop references to the 20% target, but the Japanese refused to accept the US contention that progress must be measured in terms of a market share increase. They argued that the agreement should include commitments to expand purchases of foreign products and to develop long-term customer-supplier relations. Extra market share might be the result of these, said the Japanese, but it should not be the criterion of success."

*Exam Question 2:* Evaluate the historical development and current success of US behaviour in the light of the following US document [6 August 54]:

The President [Eisenhower] opened the discussion after a brief silent prayer. Secretary [of State] Dulles introduced lengthy consideration of the need for negotiating international trade agreements with Japan. He indicated that there was little future for Japanese products in the United States.... Secretary Dulles said that in Japan he had lengthy meeting with Premier Yoshida. [He] told Yoshida frankly that Japan should not expect to find a big US market because the Japanese don't make the things we want. [reprinted from Fortune, Spring, 1988].

### #1 In a List of Pleas Least Likely to Get a Canadian Judge's Sympathy

"Despite her plea for a discharge to protect her career as a sociologist, union activist Paddy Musson was convicted Tuesday of mischief. She was fined \$150 for her part in a 14 Oct 87 sit-down demonstration at the strikebound Highbury Ave. mail-sorting plant.

"Musson told provincial court judge Allan Guthrie that a criminal conviction would close certain doors to her, but Guthrie said could see no service to the public by giving her a discharge and fined her, with the option of 15 days in jail....Guthrie found Musson guilty of causing mischief by willfully interfering with the arrival of three

busloads of strikebreakers....[He] pointed out that Musson [a community college instructor]...was not a member of the striking post union." [from Pat Currie's story in the London {Ontario} Free Press, 16 June 88].

### Innovations Et Reseaux Pour Le Development

IREC is an international network of 800 peasant associations, artisans and women's groups, organisations for development action in urban surroundings, and associated institutes. Its members appear to specialize in small-scale mutual aid projects using appropriate technology. It publishes IREC FORUM bimonthly (mainly in English), with short news notes from around the world. For example, the 80 pp. 6/88 issue has a summary of a conference in Bamako on "La pratique de la communication en milieu rural" which discusses training and activities in Francophone Africa.

### Where What They Say Is Not What They Do -- Much Less What They Mean to Say (With Apologies to Irwin Deutscher)

"England is a semiologist's paradise, a novel that Henry James didn't quite write. It is a land where all is sign and nuance and cryptic scruple. People decode your house, your accent, your socks, your taste in magazines and movies, the way you talk about the weather. A puzzled look comes over their faces at the simplest remark, as if you had suddenly dropped into Sanskrit. They don't have any trouble understanding what you have said, they are trying to work out what you mean. This is particularly difficult if by any chance you mean what you say. Asked how you are, you don't answer 'fine' or 'great' or 'not too bad considering.' That's if you really feel fine. If you felt lousy you might say you felt great. We make wonderful spies because we think the double life is the only life." [Michael Wood in NY REVIEW OF BOOKS, 22 OCT 87].

### Recent Conference Stuff of Interest

Young-mei Tsai (at ASA's Atlanta, 8/88), "The Community Question Revisited."

G. Kiger & P. Riley, "The relationship between community integration and mental health in rural areas;" K. Heyman & S. Salamon, "Social status and social networks: Family and the rural community;" (at the Rural Soc. Sty, Athens, GA, 8/88).

### Networks Fill Cavities

A 1986 US survey showed that 57% of all dentists were chosen through referrals from friends and relatives; 13% came via professional referrals; 11% were selected from advertising (with poorer patients relying on advertised services more than higher income groups.) In evaluating dentists, the highest points went to attitude (friendliness, concern) with painless treatment coming in next. [DENTAL PRACTICE MANAGEMENT, Summer 1988]

### When Sam Looked Beyond Triads

"Discrediting research uncomfortable to the nuclear industry is an old and oft-used tactic. One little known incident occurred in 1971 when Lester Lave & Samuel Leinhardt of Carnegie- Mellon U attempted to publish an analysis linking radiation levels from nuclear testing fallout with the general US mortality level. The previous year, they had published an analysis linking air pollution with US mortality in SCIENCE magazine. They then applied the same statistical model to registered levels of airborne radioactive particles.

"In a conservative and cautiously worded study, they concluded that: 'in spite of relatively poor quality radiation data, the effect of radiation levels on the mortality rate was found to be substantial.' Furthermore, the study implied, more accurate data would almost certainly yield higher figures. In fact, radiation was found to have a greater effect on US mortality than air pollution.

"The paper was rejected from SCIENCE, without any proper explanation. For more than a year afterward, the authors approached various scientific journals. Finally, the paper was accepted for an obscure governmental journal, RAD DATA & REPORT, which itself was abolished by the Nixon administration a few years later. After that, says Lester Lave, 'we got back the galleys and reviewed them. Everything was all set. Then I got a call from the publication, and they said that the plans for publication had been cancelled. I was told that the AEC (US Atomic Energy Commission) objected to our findings.'

"It was later learned that the printing plates themselves had been physically destroyed. Lave concludes: 'by that time, this thing had been going on for a year. It was clear that a battle was going on, and we weren't ready for the fight.' Although it would require a tremendous amount of work and resources to bring the study up to date, Lave still stands behind his original findings." [from Brian Jacobs, "The politics of radiation," GREENPEACE MAGAZINE, 7-8/88, pp. 8-9.]

## Groupware

Everybody knows that network analysts are ahead of the game. A decade ago, Peter and Trudy Johnson-Lenz were calling their software to facilitate computerized conferencing, "Groupware." Now SCIENTIFIC AMERICAN (7/88, pp. 110-112) reports that "groupware" -- collaboration technology -- is hot. Xerox PARC program, "Cognoter," allows individuals to contribute ideas to a central screen and then work together to organize them into a related, logical form. "Lens," written by MIT's Thomas Malone, enhances electronic mail. It sorts messages into user-defined files and extracts from the network public messages that match an individual's interests. Terry Winograd's (Comp Sci, Stanford) "The Coordinator" tries to force participants to make and act on commitments. "There are circumstances where it is good to be vague, but I intuitively feel that vagueness is tied to face-to-face conversations."

## But Only Structural Analysis Can Help Us to Understand the New York Yankees

I contacted several Toronto book stores in my neverending quest to promote the Wellman-Berkowitz, SOCIAL STRUCTURES book. Here's one reply:

"Thank you for your letter regarding SOCIAL STRUCTURES. If we had a section for sociology, we would definitely want your book. However, we specialize in fiction, poetry and baseball. We do hope your book does well." Irene McGuire, Writers & Co.

## Goya, Picasso & Networks, Too!

Continuing its tradition of testing sociological responses to heat waves, the International Sociological Association has recently announced that the 12th World Congress of Sociology will be in Madrid, 9-13 July 1990. INSNA will participate directly as a "Special Interest Group," with two sessions set:

- Interpersonal Networks (Barry Wellman, organizer, Soc, U of Toronto, 563 Spadina Ave, Toronto, Canada M5S 1A1; tel: 416-978-8263; WELLMAN@UTOREPAS);
- Interorganizational Networks (Peter Carrington, organizer, Soc, U of Waterloo, Waterloo, Ontario, Canada N2L 3G1; tel: 519-885-1211; PJC@WATDCS)

These two sessions will try to accept all respectable papers, so we all can go to the Prado. But if INSNA members get moving now, it should be easy to organize more sessions, either through the ISA's substantive research committees or as ad hoc groups. Interested parties should contact Barry Wellman for more details.



# BITS AND PIECES

*Susan Greenbaum*

This is a small column (which will perhaps be larger in subsequent issues), which replaces part of the former contents of NETWORK NOTEBOOK. Barry's column, TIES AND BONDS, has subsumed much of what previously was in the notebook section. The new name connotes the fact that this is a residual collection of items, and there is a certain literary parallelism between ties and bonds; and bits and pieces. At any rate, I had to call it something.

## NIA Funding Opportunities

The BEHAVIOR AND SOCIAL RESEARCH PROGRAM at the National Institute on Aging (Building 31/Room 4c32, Bethesda, MD 20892) is seeking grant applications in several areas.

The Program invites applications for research and research training on the social, psychological, and environmental aspects of Alzheimer's Disease (AD). Researchable topics include 1) social and behavioral factors that predict onset of perceived symptomatology and the course of the disease; 2) effects of the AD patient on family and friends, the nature of informal support, and the relationship between informal and formal support; and 3) social and behavioral strategies, human factors approaches, environmental design, and new technologies to compensate for AD-related deficiencies in the patient and to reduce the burden of care. For additional information, contact "Psychological Aspects of AD" at the address given above.

Another topic for which the Behavioral and Social Research Program is seeking applications is Cognitive Functioning and Aging. An announcement calls for research on the relations among external contextual influences (e.g., tasks characteristics, experience, social relations), internal influences (e.g., health status, emotions), and cognitive functioning in the middle and later years of life. Individual differences approaches and research into cognitive interventions -- such as training -- are also encouraged. Upcoming applications deadlines are June 1 and October 1. For additional information, contact "Cognitive Functioning and Aging" at the address above.

## Call for Papers #1

Comparative Urban and Community Research, an annual review, has issued a call for manuscripts in the following topical areas:

"Social Movements, Political Mobilization and Collective Action," submission deadline -- 6/30/89 (expected for publication in 1990);

"Socialist City/Capitalist City," submission deadline -- 6/30/90 (to be published in 1991). For information, contact: Michael P. Smith (editor), Comparative Urban and Community Research, Dept of Applied Behavioral Sciences, University of California, Davis, CA 95616, (916) 752-2684 or 2243.

## Call for Papers #2

"Research in Social Policy: Critical, Historical and Contemporary Perspectives." The general editor of this JAI Press Annual Series is soliciting papers and detailed paper abstracts for Volumes III (1990) and IV (1991). This peer-reviewed annual, which focuses more on theoretical than practical analyses, attempts to fill the gap in the social policy journal field by: a) encouraging historical as well as contemporary cases of social policy developments and implementation and b) stressing unconventional interpretations of social policies (e.g., Marxism, phenomenology, psychohistory, critical theory, politics of underdevelopment, and internal colonialism). It publishes papers on social policies as developed by elite decision-makers in States, missions, foundations, communities, international political bodies as well as those which explore the response of subjects of such policy-making. Papers should be no more than 40 pages in length (Chicago Manual style) and paper abstracts should be at least four

pages. Submission deadline is April 30, 1989. Send papers and abstracts to: Professor John H. Stanfield II, General Editor, RESEARCH IN SOCIAL POLICY, Sociology Dept, The College of William & Mary, Williamsburg, VA 23185.

### Thanks to Peter & Nan

Peter Marsden and Nan Lin, editors of the book SOCIAL STRUCTURE AND NETWORK ANALYSIS, have once again donated their annual royalties to INSNA. Many thanks for this contribution. Readers of this column may wish to consider the multiplier effect ensuing from the purchase of this book, which is a good thing for us to own anyway. Emulation of Peter and Nan's generosity by other authors of royalty-generating publications would, of course, constitute another sort of multiplier effect, which could in turn yield the authors greater sales of their books among the subscribers of INSNA....

### Networks in City And Society

CITY & SOCIETY is the name of a journal published by the American Anthropological Society and sponsored by the Society for Urban Anthropology. In a recent issue of the journal, editor Alvin Wolfe made a plea for a rededication by urban anthropologists to advancing and utilizing social network analysis. He observed that, although anthropologists were among the pioneers in developing network analysis, their participation in this burgeoning interdisciplinary enterprise appears to be dwindling. Taking advantage of our interlocking directorships on SUA, CITY & SOCIETY, and CONNECTIONS, AI and I are attempting to intervene in this observed decline. Members of SUA have been invited to subscribe to CONNECTIONS; members of INSNA are invited to subscribe to CITY & SOCIETY (annual sub rate of \$30.00). Further we are issuing a call for someone (not necessarily an anthropologist) to serve as editor of a special issue of CITY & SOCIETY focused on social network analysis in urban anthropological research and/or social networks in urban society. It has been nearly 20 years since Dan Aronson edited a special issue of CANADIAN REVIEW OF SOCIOLOGY AND ANTHROPOLOGY, (1970 7:4) on urban social networks. Surely it is time to revisit this topic. Anyone interested in taking this up, please contact Al Wolfe; Dept of Anthropology; Univ of South Florida; Tampa, FL 33620 (813) 974-2209.

### Yippie Networker Turns 50

Jerry Rubin, one of the more pugnacious, one might even say obnoxious, of the Chicago Seven, experienced the big 5-0 this summer. In a New York Times article about Jerry's birthday, readers were brought up to date on the effects maturation has wrought on his orientation to the rapid, capitalist-pig dominated US society. First noting his much dramatized exploits in the 60s, such as dumping dollar bills on the floor of the New York Stock Exchange, the article goes on to tell us:

"In recent years, he has generated nearly as much publicity by running a business that promotes a pastime called 'Networking' -- through which people pay hefty fees to go to parties where they might meet someone who can advance their careers." Never trust anyone who earns under 30K.

### American Indian Networks

The legal definition of an "Indian" in the United States, in terms of eligibility for the services provided by the Bureau of Indian Affairs (BIA), specifies that such persons must be enrolled members of recognized tribal entities. This requirement rests on the fact that special aboriginal rights and perogatives are based on treaty relationships between the United States and the various Indian nations. For a variety of historical reasons, however, many American Indian groups in contemporary US society have never obtained, or have lost, official status as "tribes." Hence, their members are not eligible to receive health and educational benefits, and they have no formal protection for their land.

The Mashpee Wampanoags of Cape Cod, Massachussetts, provide a good example of the implications of this lack of status. Descendants of the Indians whose guileless hospitality to the Pilgrims gave us Thanksgiving, the contemporary Mashpees are locked in a staggeringly mismatched conflict with the New Seabury Corporation. New Seabury is a development firm, part of a massive multi-national conglomerate, which in past 15 years has managed to acquire nearly all of the land previously held by the Mashpees. In a law suit filed by the Mashpees in the mid

70s, New Seabury was able to hire James St. Clair (Nixon's lawyer during his Watergate troubles), who succeeded in defeating their claim on the grounds that they were not a tribe.

The Mashpees and about 100 other Indian groups are presently petitioning the federal government to be formally recognized as Indian tribes. Federal recognition would provide the Mashpees with a powerful tool in gaining restitution and avoiding further dispossession.

The BIA has published a set of genealogical and sociopolitical criteria which such petitioners must meet in order to become recognized. Petitioning groups are expected to conduct extensive historical and sociological research verifying their continuous tribal existence. Research data are then presented as evidence in a formal document which addresses each of the separate criteria.

A particular problem that the groups and their researchers have faced in this process is demonstrating the existence of a "community" among the contemporary members. The problem is both conceptual and methodological. There is no clearly agreed-upon definition of what a "community" actually is; human associations are highly fluid over time and assume many different forms. In view of these ambiguities, the BIA has showed some [although arguably not enough] flexibility in its interpretations of the "community" criterion. However, the problem remains of providing convincing empirical evidence that the enrolled members of the petitioning group actually constitute a social community, however that might be defined. Social network analysis seems to be especially well suited to address both the conceptual and methodological problems this issue has raised for applied social science. Further, there is wide agreement, both among researchers currently involved in this work and the researchers who make up the BIA review teams, that social network analysis holds promise for resolving these problems with the recognition process. However, for most this has remained only an appealing metaphor, which has thus far not helped much to elucidate the difficulties.

My purpose in writing this is to call on the readers of CONNECTIONS to ponder some suggestions about how social network analysis might be applied to both the general issue and specific cases where research is presently underway. I would be very interested in hearing from those who would like more information or have thoughts about this they want to pass along. There are many groups in need of direct research assistance. Less active consultation would also be valuable. I am familiar with several cases that pose special problems from the standpoint of conducting a social network analysis, the details of which I would be happy to share. Finally, the Senate Select Committee on Indian Affairs and the BIA itself are currently reviewing and reassessing the acknowledgment process, providing a timely juncture for policy input. Anyone interested should contact: Susan Greenbaum; Dept of Anthropology; Univ of South Florida; Tampa, 33620, (813) 974-2209.

# CONFERENCES

## Sunbelt IX Social Network Conference Call for Papers

● Bay Harbor Inn, Tampa, Florida, February 9-13, 1989

### **The Conference:**

The Ninth Annual Sunbelt Social Network Conference is scheduled for February 9-13, 1989 at the Bay Harbor Inn in Tampa, Florida. The conference has become a major forum for social scientists, mathematicians, computer scientists and others interested in social networks. The conference provides an opportunity for individuals interested in theory, methods, or applications to come together and share ideas and common concerns. This year's conference is sponsored by the International Network for Social Network Analysis, the Department of Sociology and Anthropology and the Institute for Coastal and Marine Resources at East Carolina University and the Departments of Anthropology at the University of Florida and the University of South Florida.

### **The Program:**

Current plans for sessions include: network software, cognitive networks, networks and biology, community, social support, intraorganizational, inter-organizational, diffusion, technology transfer, psychological support, marketing, paradigms, theory, international networks, exchange, migration, world systems, marginality, graphics, negativities, epidemiology, science networks, networks in anthropology, and contributed papers. This list is still tentative and those who wish to organize a session should contact the program chair at the address below.

### **To Submit a Paper:**

Contact the Program Chair:  
 Jeffrey C. Johnson  
 Institute for Coastal and Marine Resources  
 East Carolina University  
 Greenville, NC 27858-4353  
 (919) 757-6220  
 (919) 757-6752

All papers proposed for presentation must be accompanied by a camera-ready abstract of up to 200 words sent to the program chair no later than December 15, 1988. Submission of more than one multiple-authored paper is acceptable. However, please limit your submissions to no more than one single-authored paper.

### **The Setting:**

The Bay Harbor Inn is located on the shores of Tampa Bay just ten minutes from the Tampa International Airport. In addition to an extensive beach, guests have access to complimentary sailing (3 puffers), windsurfing, and tennis. Complimentary transportation to and from the airport is provided. A variety of restaurants are available within walking distance.

Conference sessions will be scheduled to allow a block of free time in the early afternoons for informal get-togethers or for enjoying the sun, water, and complimentary sailing and windsurfing.

### **Registration and Hotel Reservations:**

Registration fee for the conference is \$30.00. Tickets for the key-note speaker's banquet are \$22.00. Reservations can be made by calling either of two toll-free numbers.

For those in Florida: 1-800-282-0613

All others: 1-800-237-7773

Or write to:

Bay Harbor Inn

7700 Courtney Campbell Causeway

Tampa, FL 33607

\$80.00 single or double (run of the house). Rooms guaranteed by major credit card only. Reservations must be made by January 5, 1989.

## **Iowa Conference on Personal Relationships** **Call for Papers**

•Second Annual, Iowa City, May 11-15, 1989.

The review committee of the Iowa Conference on Personal Relationships calls for papers. If you are doing interesting work on personal relationships, then your paper is appropriate for consideration: there are no thematic restrictions. Submissions should be a title and abstract of up to 500 words, plus a *separate* cover page giving title, author(s) and affiliation, with a phone number for at least one author. Please indicate preferred length of time and format for presentation (poster/discussion presentation; workshop; verbal presentation for 30 minutes; 45 minutes; 60 minutes), bearing in mind that the majority of available slots will be 30 minutes and competition for the longer slots will be more intense. Proposals for panels or symposia are also welcome and should be submitted as above, but with an additional overview by the proposer in the same format. **ALL PROPOSALS WILL BE COMPETITIVELY REVIEWED.** Deadline for submissions is November 1, 1988 and decisions will be announced in December. Late submissions will be considered only for poster sessions. Send proposals to Steve Duck, 151-CSB, Communication Studies Bldg., University of Iowa, Iowa City, IA 52242, USA, (319) 335-0579, bitnet BLASTDWY@UIAMVS.

### **Iowa Network Dissertation Prize**

The Iowa/International Network on Personal Relationships (INPR) calls for nominations for the award of its second annual dissertation prize awarded to the best dissertation on a topic in social or personal relationships from any academic discipline. Submissions will be judged by an interdisciplinary panel. The prize will consist of a monetary reward (\$100.00), plus free registration for the upcoming Iowa Conference on Personal Relationships, and a "star-billing" presentation there of a paper based on the dissertation. Initial submission for consideration should consist of a three page abstract of the completed dissertation and a letter of support from the dissertation advisor, sent to Steve Duck 151-CSB, Communication Studies Building, University of Iowa, Iowa City, IA 52242, USA by December 15, 1988. After a shortlist is drawn up, a full journal style paper based on the dissertation of the successful candidate must be supplied to the interdisciplinary review committee and the final award will be announced in March, 1989.

### **Ellen Berscheid & Elaine Hatfield Award for Distinguished Scholarship in Close Personal Relationships**

The Iowa/International Network on Personal Relationships (INPR) is pleased to announce the creation of a major award, recognizing, in mid-career, sustained achievement in, and contributions to, the field of close personal relationships. Consideration for the award is open to all-comers, not just to members of the Iowa Network, and nominees may be from any academic department or discipline. The award will be given bi-annually, beginning with the upcoming Iowa Conference. Candidates should be "in mid-career" and should have made a sustained, substantial and distinguished contribution to the field of close personal relationships. The award is not to be considered a recognition of one particularly influential piece of empirical research but is to acknowledge a career of valuable contributions. Nominations should be made to Steve Duck (address above). Nomination letters, including a vita, should be received before November 15, 1988. The first award will be announced in February, 1989, and will be made official at the Iowa Conference. The award will consist of a plaque, a cash payment, and free attendance at the Iowa Conference, at which the award will be made and a paper presented by the winner.

**The Gerald R. Miller Award for Early Career Achievements**

This award is open to all-comers from any academic area, with the restriction that nominees must have received their PhDs not more than 10 years ago. The award will be made every two years, at the Iowa Conference, beginning with the upcoming conference in May 1989. The award is intended to recognize a body of work by a young scholar who has made an important contribution to the field of close personal relationships. Nominations should be made by letter to Steve Duck (address above) by November 15, 1988. Nominees will be asked to submit vitae if they agree to be considered for the award. The award will be announced in February, 1989 and made in May, 1989 at the conference. It will consist of a plaque, a cash payment, and free attendance at the Iowa Conference, where the award will be made and a paper will be given by the winner.

# OBITUARIES

## Bruce H. Mayhew

(1937-1988)

Bruce H. Mayhew died March 3, 1988 after a nearly two-year battle with cancer. He did his graduate work at the University of Kentucky, where he received his Ph.D in 1966. He taught at Washington State University, Vanderbilt University, and Temple University, before coming to the University of South Carolina in 1975. He published 36 articles, most of them in the most respected sociological journals, *AJS*, *ASR*, and *Social Forces*.

He had a creative and forceful intelligence, the sheer power of which could be awesome to behold, but perhaps his greatest gift was his ability to reformulate and re-orient theoretical and empirical questions. He argued that without a *sociological baseline* one didn't know what the real questions were. Two examples will illustrate. For instance, conventional assumptions implied that sociologists needed to explain why there is *so much* inequality in groups, and why crime rates are *so high* in large cities. After developing a sociological baseline for these phenomena, he concluded that the really interesting questions were the opposite of those being asked.

In the case of inequality, if one assumes that all individuals (e.g., households, villages etc.) are indistinguishable, and that units of wealth are indistinguishable (a necessary definition of money) and then *randomly* distributes wealth -- *equality is the least likely outcome*. Randomly distributing units of wealth to unidentified and indistinguishable individuals produces inequality *by chance alone* (Mayhew and Schollaert 1981). Moreover, predictions from this simple sociological model come very close to observed distributions of wealth in a variety groups and cultures. Thus the real sociological question may be *why there is so little* inequality in groups, not why there is so much. Furthermore, since the existence of *social inequality* (strata) is a direct and simple consequence of the volume of wealth and the number of individuals it is distributed among, the hoary question of how individual differences *produce* social inequality also dissolves. For him the sociological question was what factors affect the existence and degree of inequality, not *who* gets what.

Generating a baseline for the number of expected contacts in groups similarly inverts the question of crime rates. An increase in the size of a group *multiplies* the number of expected contacts, it does not simply add to them. Thus dividing the number of crimes by population size, does not control for the effects of size on crime opportunities (Mayhew and Levinger 1976). In fact, when one does consider the actual effects of size on opportunities for crime (assuming the individual propensity to commit crime is constant) -- the crime rates in big cities are *lower* than would be predicted. Again, a baseline constructed from a *sociological* perspective, reverses the conventional research question.

Parts I and II of "Structuralism vs. Individualism" (*Social Forces* 1980, 1981) provide the clearest view of his "structuralism." As they reveal, he was unwilling to waffle on, or compromise, his intellectual positions and he was unwilling to hide or soften them with qualifiers and euphemisms. The strength of his (socio)logic together with his clarity of expression, thus simultaneously appealed to, and alienated, (different) readers. For example, taking the definition of sociology seriously (i.e., the study of society or societies, or even more broadly, the study of social phenomena) he maintained that, the "individualists" (i.e., those who claim the object of study is the behavior of individuals) were not simply doing sociology poorly or ineffectively, but that they were *not doing sociology at all*. There was no room for compromise. It was not simply an issue of methods, measures, or level of analysis -- it was an issue of the fundamental question(s) addressed. Thus one either accepted the criticism and thereby rejected much that was thought to be sociology, or one rejected the criticism. He expected most to do the latter. In fact, if anything surprised him, it was the number of favorable letters he received following publication of the articles in *Social Forces*.

He provided the impetus and the intellectual center for an amorphous aggregate of sociologists at the University of South Carolina which came to be known as the "Structuralist Group." Although nominally a group of like-minded scholars sharing a "structuralist" approach to the study of social phenomena (and he did assemble or convert a number of such scholars), it was much more than that. It was a virtually open forum for research and researchers. Meeting on Monday afternoons, the topics considered ranged from formal models of chicken attacks to

the size and sex composition of voluntary associations in Nebraska. Sometimes the first germs of ideas which were later to become full-blown research projects and publications were presented, other times the group served as a sounding-board for responses to reviewer's and editor's comments and criticisms. The intellectual stimulation and effectiveness of the group are attested to by the number of acknowledgments of it. No topic or methodology was out of bounds. Even when it didn't appear to have even the most tenuous connection to "structuralism," Bruce would find some connection or structural aspect.

To those who did not know the man, his writings might suggest that he was a cold, logical, critical person, with little tolerance for differing views. Those who knew him personally saw a different man. True, he did not suffer fools (or administrators) gladly (and he may have mellowed with the passing years), but he was a warm, considerate man with almost unlimited patience for those who couldn't agree with, or understand, his views. He was a wonderful teacher, not because he entertained his students, but because he challenged them to think, and taught them, in ways they could understand, the most important things he had learned or discovered. It didn't matter whether they were elementary or advanced, his courses, like his research, dealt with the most fundamental and important sociological questions. His goal was to advance and disseminate a nomothetic understanding of social phenomena. yet, he was not a naive "ivory tower" scholar, he was a fascinatingly complex and interesting individual, with a challenging, and often amusing, view of almost any subject that would arise. It is an understatement to say that he will be missed by all who knew or worked with him.

He is survived by his wife Dr. Kathlyn Fritz. She requests that memorials be made to the Richland Memorial Hospital Cancer Research Center (in Columbia South Carolina), or to the Department of Sociology at the University of South Carolina to establish an annual memorial lecture in his honor.

Patrick Nolan  
John Skvoretz  
University of South Carolina

#### References

- Mayhew, Bruce H. 1980. "Structuralism Versus Individualism: Part 1, Shadowboxing in the Dark." *Social Forces* 59:335-75.
- \_\_\_\_\_. 1981. "Structuralism Versus Individualism: Part II, Ideological and Other Obfuscations." *Social Forces* 59:627-48.
- Mayhew, Bruce H. and Roger L. Levinger. 1976. "Size and the Density of Interaction in Human Aggregates." *American Journal of Sociology* 82:86-110. Mayhew, Bruce H. and Paul T. Schollaert. 1981. "A Structural Theory of Rank Differentiation." Chapter 10 pps. 287-323 in P. Blau and R. K. Merton (eds.) *Continuities in Social Inquiry*. Beverly Hills: Sage.

#### In Memoriam -- Nick Mullins

Nicholas Mullins, professor of sociology at Virginia Tech, died July 6, 1988, after a two-year battle with cancer. Nick was an original Harvard grad student member of Harrison White's band of proto network analysts. Indeed, I first met Nick at the start of grad school in George Homans and Florence Kluckhohn's seminar. We went around the room telling what great deeds we had done the previous summer. I had been a camp counselor and met my future wife -- no mean feat. Nick, already married to Carolyn, had moved on to reading Pareto -- all of it. "Who's Pareto?" I whispered to my neighbour, Joel Levine. Nick kept on being first. He got the interesting jobs -- at Vanderbilt, Dartmouth, Indiana, and then Virginia Tech (where Carolyn became a leading professor of technical writing: her teaching helped make CONNECTIONS spritely). He was the first of our group to figure out block-modelling. He tried mightily at the Camden conference to show how easy it was to the rest of us blockheads.

And then Nick put network analysis on the US map. His THEORIES AND THEORY GROUPS has a smart chapter on network analysis: its history, underpinnings and promise. He named names: many (then) young whipper-snapper got labelled as an important figure, central to the field. This got results and even got some of us tenure! I remember going into a Toronto tenure hearing for Nancy Howell. "Who is this person? What has she done?" asked a dean. Mullins' book in hand, I demonstrated her eminence. Dean silenced; case closed. (Nancy grew up to be a dean herself, asking the same questions).



Nick's book also godfathered INSNA. Nick argued in every chapter that organizational leaders and self-promoting institutions were crucial to give theory groups staying power. But he said these roles weren't being filled for network analysis. Waiting a few years to summon the courage, INSNA leapt in.

Nick kept founding things. He pretty well initiated the now-popular approach to studying scientific specialties as a network phenomenon. He spent the past decade godfathering the 4S -- the sociologists who study science. (One of the nice things about the THEORY GROUPS book is that it showed how sociology has behaved like other sciences.) I especially enjoyed some fun anti-conspiracy stuff which showed that NSF/NIH committee membership was pretty random.

Bev and I were lucky enough to visit Nick and Carolyn at their Blacksburg home two weeks before he died. We had a great time. Nick, as usual, was cheerful, serious, professional. He was looking forward to going to the Atlanta ASAs. He wasn't kidding himself -- all of his statements were future conditional. But he had converted his bout with cancer -- spleen, lymphatics, chemotherapy, bald head and all -- into a wonderful new area to study. He had Johns Hopkins Hospital analyzed, from micro interactions around the intravenous bottles to its macroscopic place in the larger scheme of things. His mind was working, his body was moving, his face was smiling. He had resolved to live, fully, until he died. The rest of us can do no more.

*Barry Wellman*  
*University of Toronto*

## MEETING CALENDAR

### **Contemporary Technologies for Processing Socioeconomic Information With Data Analysis Models and Methods, Institute of Social Management, Sofia, Bulgaria, September 15-October 1, 1988.**

The International Workshop is intended to create opportunities for comparative study of the technologies adopted by the different scientific schools in the field of data analysis on the basis of real data. A proceedings volume (in English) is planned. Conference languages are Russian and English. For more information, write: Dr. V. Zdravkov, Institute of Social Management, Pionerski Pat 21, Sofia 1635, Bulgaria.

### **Nordic Conference for Health and Social Workers, Norwegian School Of Social Work, Oslo, September 19-22, 1988**

Topics addressed in the conference adhere to the theme, "Self- help strategy on group and community level," and include: Introduction to network- and local community theory as a base for understanding the local community's own competence; Networking in the neighbourhood/how to promote the local community's own competence; The role of informal helpers in community work; Research, theory and ideology concerning goals and functions of self-help groups; Developing and supporting of self-help groups. Language is mainly English. Inquiries should be directed to: secretary Ronnaug Refsaas or Assistant Professor Live Fyrand, DIAKONHJEMMETS SOSIALHOGSKOLE; Postboks 23 Vinderen; N-0319 Oslo 3; telephone 02-46 39 52.

### **World Association for Social Psychiatry, London, November 6-10, 1988**

12th Congress. Sessions (and organizers) include "Patterns of drinking and harm," O.J. Skog, "Intervening with the relatives of people with schizophrenia," N. Tarrier, "Community care," "Social aspects of depression." Info: Conference Associates, WASP, 272 Medway St., London SW1P 2BD. Tel: 01-222-9493.

### **Society for Multivariate Analysis in the Behavioral Sciences, Biennial Conference, University Of Groningen, December 18-21, 1988.**

The conference theme is the development and application of methods for multivariate data collection and analysis in the behavioral sciences. Topics on which papers are especially welcome include: further developments in, or application of, structural equation models, loglinear models, latent trait models, graph theory, correspondence analysis, and data collection procedures. For information, contact: Organizing Committee SMABS, Dr. M.G.H. Jansen and Dr. W.H. van Schuur, Dept. of Statistics and Measurement Theory, Faculty of Social Sciences, University of Groningen, Oude Boteringestraat 23, 9712 GC; Groningen, The Netherlands (phone: +31-50-636189/636184; BITNET address: WSCHUUR at HGRRUG5.EARN).

### **Environmental Design Research Association, Annual Meeting, Black Mountain, NC, March 29-april 2, 1989.**

For information, contact Graeme Hardie, Center For Design Research & Service, North Carolina State University, Box 7701, Raleigh, NC 27695- 7701, (919) 737-7114.

**International Federation of Classification Societies,  
Second Conference, Charlottesville, VA,  
June 27-30, 1989.**

This conference is devoted to the presentation of theoretical, methodological, and applied papers on classification, pattern recognition, and related methods of statistics and data analysis in the broad sense. It includes mathematical, statistical, and practical investigations in special fields of knowledge, and the interface between classification and the Information Sciences.

Papers are invited for the meeting. Suitable topics include: 1) Classification, discrimination, aggregation and clustering methods; 2) Pattern recognition and image analysis methods; 3) Statistical and probabilistic methods for data analysis and classification; 4) Similarity and distance measures, data quality and reliability; 5) Multidimensional scaling and structure recovery methods; 6) Consensus methods and correspondence analysis methods; 7) Biological taxonomy, genome/molecular sequencing; 8) Analysis and comparison of tree and graph patterns; 9) Artificial intelligence and expert systems for classification; 10) Classification and clustering software for microcomputers and supercomputers; 11) Classification and clustering algorithms and algorithmic aspects; 12) Computer graphics for classificatory problems; 13) Practical applications in fields of biological, information, life, mathematical, medical, and social sciences. For information, contact: IFCS-89; Dept. of Mathematics, University of Virginia, Charlottesville, VA 22903, telephone: (804) 924-4919; BITNET: SJT@VIRGINIA.

# ARTICLES

## A QUESTIONNAIRE FOR THE MEASUREMENT OF SOCIAL NETWORKS AND SOCIAL SUPPORT

*Steven R. Daugherty, University of Chicago*

*Jeffrey C. Salloway & Linda Nuzzarello, Rush Medical College*

We offer here a description and explanation of an instrument designed to assess network structures and social support contents from the perspective of both individuals and groups. This instrument is the product of a long evolutionary development which began with the work of Salloway and Dillon (1973). It is designed to be easily administered and simple to analyze. As such, it offers a straightforward means of collecting and a clear formula for the analysis of data from any target of population. We hope this instrument will prove as useful to others as it has been in our own research.

### **The Instruments: The Social Network Inventory**

The Social Network Inventory (SNI) is a self report instrument which requires from fifteen to forty-five minutes to complete, depending on the number of persons listed by the respondent. Required response time can be reduced by dropping some less essential items, or by omitting either of the density matrices.

The SNI is a 8" by 14" booklet. As respondents open the front cover they are asked to first list those persons whom they "most often talk to, see, or visit" vertically down the right hand margin. This phrasing was selected to prompt respondents to adopt a behavioral criterion for each person listed. We are not asking respondents who is more important to them, rather those persons whom they come into contact in their day to day lives. Spaces for listing up to twenty-four persons are provided along the right hand margin of the booklet. The number, twenty-four is somewhat arbitrary. However, our own experience has shown that persons who list more than this number are "reaching", that is, citing persons with whom they actually have little contact. This observation has been confirmed by Burt's recent analysis of the data from the General Social Survey (Burt 1986).

After listing the persons they most often talk to, see or visit, respondents are instructed to move through the booklet answering each question for each of the persons they have listed. Questions appear across the top of each page. Answers are to be recorded beneath each question in boxes provided alongside the name of each person listed. Pages with questions are cut short on the right hand margin so that the names of the persons listed in the network are visible at all times. There are twenty questions in all, plus two density matrices at the end. Respondents move through the booklet at their own pace answering each question comparing across their network.

### **Questions and Justification**

Each question, or set of questions, is included to provide important information about the quality of the social relationships of the respondent. The aim of the SNI is to gain a picture of not only the extent of each person's network, but salient content characteristics as well. In this section each question is presented, followed by a brief justification.

*1. What is this person's relationship to you? (for example: mother, father, good friend, neighbor, acquaintance.)*

We begin, following Fischer (1981), by asking the respondent to label the relationship. These labels, in addition to providing a designation as to the foci of the relationship with the person listed also provide an indication of the respondent's perception of the relationship, as for example, in the distinction between "friend" and "good friend". We want the respondent to represent each person to us as they see that individual.

2. *Is this person a...*

This question changes with the population under study. It is intended to provide a basis for examining the segments of a person's network. Recent analyses have shown that much information may be lost in treating networks as a whole (Salloway, Daugherty, Nuzzarello 1987). For example, the options might be "co-worker, family member, social acquaintance, other". Although theoretically this information could be gleaned from the relationship label, those are at times ambiguous. This item allows a simple segmentation of the network as categorized by the respondent.

3. *How old is this person? (in years).*

By finding out the age of each person listed, we are able to test for age homogeneity within the network. A number of investigators have suggested that age homogeneous networks are better sources of support, especially within younger cohorts ~ (Ward et. al. 1985).

4. *About how long have you known this person? (in years).*

The length of time known provides a partial index as to the importance and endurance of the person in the network (Marsden and Campbell 1984) as well as the stability of the network as a whole.

5. *How close do you feel to this person?*

The direct question of closeness provides another index of the importance of the person listed. When summed over the network, it yields a coefficient of generalized intimacy within the network as a whole. Marsden and Campbell (1984) report this to be the best single index of "tie strength" within the network.

6. *Does this person live in...?*

This question also changes with the population under study. Choices should reflect geographic proximity in a manner which permits the assessment of the general dispersion of the network across space. For example, the options might read: "my home, my building, my neighborhood, this city, the suburbs of this city".

7. *About how often do you talk to this person on the phone?*

8. *About how often do you see or visit this person?*

These two questions are intended to tap the frequency of interaction with each person in the network. This also provides a behavioral measure of the degree to which the persons listed are a part of the respondent's daily life.

The next set of questions assesses specific supportive exchanges.

9. *Has this person ever talked to you about any of his problems in any of these areas? (mark all that apply)*

- a. *social/relational*
- b. *academic*
- c. *financial*
- d. *sexual*
- e. *family*
- f. *health*
- g. *marital*
- h. *other*

10. *Of the people you have listed, which one would...*

- a. *you call regularly if they knew you were having problems?*
- b. *ask you to give up time if they needed help?*
- c. *turn to you for help with an intimate personal problem?*
- d. *ask you to lend them money to help cover bills, if they had it?*

11. *Among these people, who would take your advice seriously if they had a problem?*

These three questions are a part of the Social Support Assessment portion of the SNI. Two domains of supportive exchange are assessed here: cognitive and behavioral. Respondents are asked about two types of support: Problem Sharing and Helpful Actions. Problem Sharing is defined by summing the number of problems talked about (question 10) with each person and dividing by the number of persons listed. Helpful Actions is defined by summing the "yes" responses for the four items of question 10 and question 11. This set of questions asking what others might expect from the respondent constitutes the "drains" on an individual's time and resources.

12. *Have you ever talked to this person about any of your problems in these areas? (mark all that apply)*

- a. social/relational*
- b. academic*
- c. financial*
- d. sexual*
- e. family*
- f. health*
- g. marital*
- h. other*

13. *Of the people you have listed, which one would...*

- a. you call regularly if they knew you were having problems?*
- b. ask you to give up time if they needed help?*
- c. turn to you for help with an intimate personal problem?*
- d. ask you to lend them money to help cover bills, if they had it?*

14. *Among these people, whose advice would you take seriously if you had a problem?*

These three questions are the reciprocal to the questions on "drains". Here they are phrased in terms of what the respondent can expect from others. The same Problem Sharing and Helping Actions indices are computed, only here they are indices of "support". By comparing drains with supports, one can determine the degree to which a person's network is an asset or a liability.

These next two questions assess the amount of antagonism within the network.

15. *How often do you and this person experience interpersonal conflict (i.e. argue or disagree)?*

16. *When you do have a conflict with this person, is it generally*
- calm and rational*
  - tense but controlled*
  - heated and emotional?*

These two questions address the issue of conflict within the network. House and his colleagues (1985) have demonstrated that networks are not universally supportive and can sometimes be a source of distraction and tension. How this conflict is handled, by holding in the hanger or letting it out, has been linked to an array of physical and mental health issues (Julius, et. al. 1986). Together these two questions allow the pinpointing of conflict-filled relationships, as well as the general extent and intensity of conflict for the network as a whole.

17. *Is this person male or female?*

This question is straightforward. We want to be able to know the gender composition of a respondent's network. The recent work of Nan Lin and his colleagues (1986) suggests that women play a special role in the organization of social relationship and the provision of social support.

18. *How satisfied are you with your relationship with this person?*

19. *How satisfied do you think this person is with your relationship?*

These two questions, one direct and one projective, are summed to provide an index of satisfaction with each person listed, and for the network as a whole. Together they provide a measure of emotional support, the third component of the Social Support Assessment battery.

20. *Is this person currently a sexual partner?*

This somewhat risky question is included to provide an indication of those relationships which are qualitatively different from others in the network. There is some question as to whether these relationships are more supportive or more stressful than those which are less sexually intimate.

#### Optional:

The next two items constitute matrices of the interrelationships within the respondent's networks. Respondents are asked to duplicate their list of contacts across the top of the booklet... This list is already enumerated down the right hand margin of the book, so the task is a simple one of recopying one time for both items.

21. *Some of the people you have listed know each other, that is: a) they have met at least once; b) each person knows the other's name; c) each person could contact the other if they had to. Place a check in the grid for each pair of persons who know one another.*

This question asks respondents to first write the names of the people they listed in the spaces provided across the top of the booklet and then to make checks in a grid for each set of persons who know each other. Because "knowing someone" is assumed to be symmetric, respondents need only fill out half of the grid.

22. *Some of the people you have listed may usually be present when you see that other person. Place a check in the grid each time a person is usually present when you see that other person.*

This question makes use of the names written across the top of the booklet for the previous question and requires a similar type of response. Respondents are asked to place checks in another matrix according to whether this person is usually present when they see another listed person. Because this relationship cannot be assumed to be symmetric, respondents must place their checks over the entire grid.

These two questions are only considered optional because of the time they require to complete. The two grids yielded by these questions provide a picture of the connectedness of the respondent's network. The issue here is whether the persons whom the respondent knows also know each other.

By counting all the checks in the respective grids, a density index may be computed. The index for number known is:

$$I = (\text{known}^2)/((N * (N-1)))$$

The index for number present is:

$$I = (\text{present})/((N * (N-1)))$$

### Issues and Illustrative Data

#### A. Samples.

We have collected multiple samples using this instrument in various forms:

1. A medical school class sampled at six month intervals over the four years of training.
2. A population of persons with chronic diseases such as MS, Huntingtons, etc.
3. A class of nursing students sampled at the beginning and the end of their 18 month program.
4. A women's singing group.
5. Three shifts at a local fire house.
6. We are in the process of replicating our original sample with two additional medical school classes.

#### B. Relations among computed variables.

Table 1 presents a factor analysis of eighteen variables computed from the SNI based on a combined sample of two medical school classes with  $N=232$ . Four meaningful factors emerge which, after rotation, account for roughly equivalent segments of the variance. Based on the factor loadings we would name these four factors as follows: Composition, Interaction, Support, Confrontation.

#### C. Social Networks related to Social Support.

Our analyses on all counts show that social network variables as measured by the SNI show little or no relationship to social support. As we operationalize them, the two are empirically independent. In Table 2 the correlation between the set of social network variables and the social support variables shows little relation between them. The factor analysis in Table 1 shows that network and support factors load on separate factors, confirming these initial impressions. Knowing the structure of someone's network tells us little about the perceived availability of support.

Table 1. Factor Analysis of Social Network Inventory using combined data from two medical student classes. N = 232. Varimax rotation

FACTOR:	ONE	TWO	THREE	FOUR
% relatives	.900			
years known	.819			
density	.539	-.490	-.218	
% male	-.243			
# known	-.535	.371		
% others	-.830			
visit freq.		.741		
geo. closeness		.740		.208
phone freq.		.672	.243	
feel close			.763	
how satisfied			.659	.238
health prof.				
sex partner			-.460	
problem sharing			-.576	.216
helpful actions			-.520	.532
get mad				.900
express anger				.780
eigenvalues	3.25	2.16	1.99	1.93
% variance	18.0%	12.0%	11.0%	11.0%

Table 2. Correlations between Network variables and Social Support variables computed from the Social Network Inventory.

	close	satif.	prob. sharing	helpful actions	mad	anger
% relatives	-.26			.15		
years known	-.30					
density	-.37		.19	.19		
% male						
# known	.16		-.21	-.28	.16	
% others	.21					
visit freq.						
geo closeness						.20
phone freq.	.28		-.20	-.21		
health prof.						
sex partner			.24	.15		

Note: only correlations over .15 ( $p < .01$ ) are included.

Requests for copies of the SNI should be addressed to:

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## COMPUTER PROGRAMS AND SOCIAL NETWORK ANALYSIS

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This is a review of the history and current state of the art in computer application for social network analysis. It documents a development from small task-specific programs to large general purpose program packages. It also shows a trend away from mainframe computers and toward micro-computers for network analysis. Seven currently available programs are examined in an attempt to show the kinds of analyses for which each is designed.

### I. Introduction

The aim of the present paper is to review the role played by computers in the development of social network analysis. The first section will describe the approach of the network analyst and attempt to characterize the computational demands generated by that approach. The second section will review some of the highlights in the history of the development of programs for network computing. And the last section will examine the current generation of programs in order to uncover their strengths and weaknesses for various kinds of applications and, finally, to make some guesses about future trends.

### II. The Computational Demands of Social Networks Analysis

Social network analysis and the use of computers in research have developed side by side over the past thirty years. As a matter of fact, as Wolfe (1978) has suggested, the development of network analysis could not have occurred in a context without computers. The sheer magnitude of the computational task required by network analysts eliminates the possibility of hand calculation.

Traditional procedures for data analysis in most social sciences are relatively simple by comparison. We have always focused on the attributes of individuals or other social actors. Thus, data come to us in the form of a rectangular, individual by attribute, matrix. Such have permitted us to use the same standard linear or log-linear analyses that are used in biology and psychology. For these kinds of analyses, the basic unit of study is the individual, and, for any one attribute, the magnitude of the computing task depends only on the number of individuals studied.

In contrast, social network analysis is not focused on the individual. It is explicitly concerned with the social relations -- the ties -- that link people to each other. Thus, the fundamental data for the network analyst are records of who is socially linked to whom. Many different kinds of social relations are studied, and data are collected on whether a given pair of individuals is, or is not, linked, or on the strength of the relation linking that pair of individuals.

Thus, because network analysts study relations among individuals, their data are recorded in square, person by person, matrices. Each relation recorded generates a matrix where each row and each column represents one of the actors studied. A given cell in the matrix contains a record of whether the row actor has the relation with the column actor, or the amount of the row actor's relation with the column actor.

For the network data, then, the unit of analysis is the pair, and, for any given relation, the size of the computing task is a function of the square of the number of individuals. This means that unless they are content to study very small networks, network analysts require considerably more computing power than that needed by the traditional analysts who study individuals.

A single network study might generate several of these matrices, each recording a different relation over the same set of individuals. But whether a study is focused on one or many relations, it is the job of the network analyst to uncover structural "patterns" in, and across, the data matrices. Thus since network analysis is explicitly focused on social structure, it requires not only big computing facilities, but entirely new kinds of programs that embody novel computational procedures.

Since the needed computational power was not generally available until sometime in the mid late 1960s, network analysis did not begin to develop as a specialty until the 70s (Alba, 1982). Some important, but small scale, network research was conducted in the mid-1950s (Barnes, 1954; Bott, 1955). But it was not until the end of the 1960s that we begin to see the emergence of large scale network data collection and analysis (Mitchell, 1969).

Typically, programs for analyzing network data involve the search for "socially important" structural patterns in data matrices. But what do network analysts see as socially important? Two main kinds of patternings have emerged as foci of interest in this context.

First, motivated by traditional concerns with "social groups," "social circles," "cliques" and the like, analysts have been concerned with uncovering collections of individuals that are both tightly linked together and more or less clearly separated from others. This is subgroup analysis and it is based on finding sets of people who are socially close to each other or proximate.

The second approach is motivated by traditional interests in "statuses," "roles," "social positions," "stations" and the like. Here analysts look for sets of individuals who are equivalent in the sense that they are linked in the same ways to the same or to equivalent others. This kind of analysis uncovers positions in the structure and it requires finding sets of people who are similar in the ways in which they are linked into the total network.

Most analytic procedures developed for the study of networks embody one or the other of these approaches. Thus, although network analysts have developed new procedures for collecting and analyzing data, their intuitive foundations are grounded in traditional social science concerns. The contribution of social network analysis lies in specifying these traditional concerns explicitly and in developing rigorous methods for studying them empirically.

### III. The development of Programs for Social Network Analysis

The earliest efforts at programming in social network analysis were all relatively simple and task specific. Each specifies a structural property of interest, and each embodied a single algorithm to uncover that property. But, as time has passed, the trend has been toward creating larger and more complex programs. These newer programs are also more apt to be general purpose in orientation. In this section the older task specific programs will be reviewed, and in the next section we will examine the newer programs.

The first network analysis programs were directed toward subgroup analysis. In 1949 Luce and Perry (1949) had specified a graph-theoretic definition of a clique. But developing an algorithm to actually find such structures in data turned out to be non-trivial. Harary and Ross (1957) finally specified an algorithm (but not a program) to find Luce-Perry cliques.

Programs were written, but the clique notion itself demanded such extensive computations that it was (and still is) painfully slow. So investigators began to seek other methods. And, lacking alternative theoretical foundations, various *ad hoc* methods for finding clique-like clusters were introduced. Many proposals were made, and finally, in 1960, Coleman and MacRae (1960) introduced a program for finding clusters that was the first really large scale computer program for network analysis. Their program would find all of the more or less distinct clusters in a group of up to 1000 individuals.

Attempts to develop new theoretical foundations for subgroup programs continued through the 1970s. Alba (1973) generalized the earlier theoretical conception of Luce and Perry, and, along with Gutman (1972), he produced and distributed a general set of computer programs, called SOCK, to calculate and display various kinds of graph-theory-based cliques. Seidman and Foster (1978) derived an alternative graph-theoretic generalization of cliques and included it in a general-purpose network analysis program, SONET, that began distribution that same year. Since SONET is a general-purpose program, it will be reviewed in the next section. Finally, Mokken (1979) proposed still another generalization based on graph theory that has, so far, not been fully implemented in a program.

Work on subgroups that was not explicitly grounded in theory continued also. In 1973 Bernard and Killworth (1973) introduced CATIJ, a computer program designed to locate subgroups through a kind of factor analysis. And in 1975 Richards (1975) released an early version of an elaborate subgroup finder, NEGOPY. This program is essentially task specific; it finds subgroups. But NEGOPY is a large and complex program. It includes, not one, but a collection of routines. Therefore, like SONET, NEGOPY will be described in detail in the discussion of contemporary programs below.

Like the earlier work on subgroups, that focused on social positions, these efforts began with a foundational theoretical essay. Lorrain and H. White (1971) soon introduced a program called BLOCKER and Breiger, Boorman and Arabie (1975) introduced another called CONCOR. Soon, Burt (1976) produced a third algorithm that he incorporated into a program called STRUCTURE. All three of these programs partition the individuals in a network into subsets, or "blocks" that each contain individuals that are approximately structurally equivalent. The Burt program, STRUCTURE, has been greatly expanded and has become quite elaborate; it too will be examined in the next section.

More recently, Sailer (1978), Everett (1982), Wu (1983), Mandel (1983), Winship and Mandel (1984), D. White and Reitz (1983) and Breiger and Pattison (1986) have introduced various modifications and extensions of

the original algebraic formalisms introduced by Lorrain and H. White. In effect, these provide alternative theories of social position. And all of these alternative theories have led to the development of new programs. Each of these new programs reveals something different about the way people are positioned in a social structure.

Finally, from the very beginning, programs have been developed that are not directly motivated either by the notion of subgroups or that of positions. Most of these programs have been designed to calculate various structural parameters of social networks. And most of them have been grounded in graph theory.

The largest effort of this sort was initiated by Bavelas (1948). Bavelas drew from the graph-theoretic notion of "center" and defined the centrality of individuals in a network. The stimulus of Bavelas' work led others to try their hands, and various other definitions of centrality were proposed over the years. Some were *ad hoc* and some were grounded in theory. I reviewed them all (Freeman, 1979) and rederived those that could be given graph-theory foundations. They were embodied in a program called CENTER.

This, then, was the state of the art in network computing at the end of the 70s. There were literally dozens of individual programs that were more or less available to network data analysts. Almost all of them were task-specific. Each was designed to permit the calculation of one, or at most a few, properties of a social network. They were written in everything from APL to PL/I, and, typically, each had been implemented on only one mainframe computer. A few, like Alba and Gutmann's SOCK, were widely distributed, but most were available only to a small ingroup of potential users. Network computing was still very much in its infancy.

#### IV. The Eighties: the Era of General Purpose Network Computing

By the late 1970s it was widely accepted that progress in social network analysis awaited some further developments in computer programming. What seemed to be needed was a general-purpose program that could integrate some or all of the existing task-specific programs into a single package. In addition, transportability was a problem. A desirable package should be easily adapted to a wide range of local computing environments all over the world.

Four efforts to produce such a transportable general-purpose package were initiated. Heil undertook the task of producing an integrated set of network analysis routines at Toronto. At the same time, Mokken and Stockman led a Dutch group centered at Amsterdam in a similar task. And D. White and Sailer at the University of California, and Payne, Deans and Mitchell at Oxford did likewise.

Unfortunately, three of these four projects were ill fated. Payne and company lost their funding in 1981. And both Heil and the D. White-Sailer team made the mistake of trying to write their program in an IBM language (no longer supported by IBM) called APL. APL is easy to write and it is useful for turning out quick and dirty "use-one-time-then-throw-away" computer codes. But APL has the unfortunate characteristic of being completely unstructured. This means that it is almost impossible to update and maintain, and it is therefore inappropriate for producing programs for general distribution. For that reason, both Heil's and D.White and Sailer's attempts faltered; only the Dutch program, called GRADAP, succeeded.

Two new efforts along the same lines were started in 1983. One of these, led by Pappi and Kappelhoff at Christian-Albrechts University in Kiel, resulted in a package called SONIS. The other, developed by a team at the University of California at Irvine, was named UCINET.

By 1984, then, six network-oriented computer programs were being distributed. They were:

- SONIS by Pappi and Kappelhoff,
- UCINET by Freeman,
- GRADAP by Mokken and Sockman,
- SONET by Seidman and Foster,
- NEGOPY by Richards, and
- STRUCTURE by Burt.

These six programs were, and still are, (along with one newer program called AL that will be described below) "the state of the art" for network computing. Each is unique in form, generality and transportability. But, in terms of their basic design philosophies, they can be divided into two distinct sets.

One set contains SONIS, UCINET and GRADAP. These programs are all very similar in conception. They are designed to be general-purpose. They each provide broad and wide ranging collections of routines that permit the use of network methods in almost any area of application. Thus each of them includes many of the task-specific subgroup, position and centrality programs outlined above. All of these programs, moreover, also include collections of network data that can be used for instruction or simply to demonstrate the routines.

SONIS was originally implemented on Siemens and CDC mainframes as well as on a DEC mini-computer. For the Siemens and the DEC, however, the portability of the program is potentially limited since parts were written in an operating-system-specific assembly language. The CDC version, on the other hand, is written entirely in PASCAL and FORTRAN-5, so it has a greater potential for being adapted for use elsewhere. For English speaking users it should be noted that the command language of SONIS is German!

UCINET was originally written in a composite composed of Basic, Fortran and Turbo-Pascal for the IBM-PC micro-computer operating under DOS. Because of the universality of DOS, the transportability of UCINET was markedly easier than that of SONIS. On the other hand, this easy transportability involved a cost. UCINET, so far, is relatively slow and may be used only on fairly small data matrices.

In addition, early versions of UCINET were inadequate in handling data transformations. Because of that limitation, Borgatti developed a program that was originally no more than a set of data transformation routines called AL. AL was written at Irvine in Turbo-Pascal for the IBM-PC.

Since later versions of UCINET have eliminated the original problem by incorporating AL-like procedures to transform data, AL has moved off in a new direction. The latest release of AL embodies high speed versions of several of the UCINET routines as well as a virtual memory option that permits (*very*) slow analysis of matrices up to 1000 by 1000 in size. Moreover, the the new version of AL includes a whole set of the newest experimental routines that may reflect future trends in the analysis of network data. AL should interest those who are in the business of developing new analytic methods for network data. GRADAP was originally written in 1981 in the ALGOL 60 language for CDC mainframes. From the beginning, therefore, it has been able to handle large data sets. Like SONIS and UCINET, it has several network data sets integrated into the program itself, but unlike those other programs, the data contained in GRADAP are large. Moreover, its routines are consistent with and can be integrated into the standard SPSS statistical package.

GRADAP emphasizes graph-theoretic procedures in measuring structural characteristics. It stresses particularly the calculation of various kinds of centralities. This means that it is somewhat less general and includes fewer procedures than SONIS or UCINET. But the use of graph theory means that the user always knows exactly what is being calculated and why.

The other set of programs, NEGOPY, STRUCTURE and SONENT are somewhat narrower in orientation than the three discussed so far. Rather than attempting to provide tools for all kinds of applications, these programs are designed to meet the specific needs of particular users. NEGOPY was written to meet the needs of people working in communications; STRUCTURE was designed specifically for applications in sociology; and SONENT was produced as an aid for research in anthropology. Thus, while SONIS, UCINET and GRADAP all aim towards increasing the breadth of applications, NEGOPY, STRUCTURE and SONENT aim to provide depth for users with particular disciplinary concerns.

NEGOPY was originally developed by Richards at Michigan State University. It was programmed in CDC Fortran Extended for the CDC 6500 mainframe. Because Fortran Extended was machine specific, the program could not originally be run on any other machine. Subsequent IBM mainframe versions were developed, and finally, to make it transportable, NEGOPY was rewritten in standard Fortran-77.

NEGOPY is essentially a practical routine to locate subgroups. It embodies a number of traditional intuitive ideas about groups and it strings those ideas together into a sequence of procedures. As a whole, this sequence of procedures seems to uncover those subgroups that are consistent with ethnographic intuition.

STRUCTURE was originally developed by Burt at the University of California, Berkeley. It was written in a general version of Fortran, so it has always been reasonably transportable. Originally, STRUCTURE was simply just another special purpose program. Its purpose was to find positions in a network through a new kind of approximation to structural equivalence developed by Burt. But the program has been extended to include a whole range of procedures of particular interest in sociological research. Although its main emphasis is still on positions, it now includes routines for subgroup detection as well as procedures to examine contagion, structural autonomy and equilibria (Burt, 1982, 1986; Burt and Minor, 1983).

SONENT was written in PL/I for IBM mainframes. Like GRADAP, it utilizes procedures based on graph theory. But, while GRADAP stresses general procedures for calculating standard structural parameters, SONENT includes some special routines based on ideas from traditional kinship analysis. It is designed primarily for applications in anthropology. Moreover, its portability is somewhat limited by the fact that it was written in a language that is only available on IBM mainframes, but for those who have access to such machines, SONENT is a powerful program.

The most recent developments include new versions of all of these programs. With the collaboration of Bruce MacEvoy, UCINET was, in 1987, released in an entirely new version written completely in BASIC. This permits greater flexibility in the sizes of matrices that may be analyzed. STRUCTURE, was recently adapted to the IBM-

PC micro-computer, and in 1987 a new expanded version was released. Both NEGOPY and GRADAP have also been tested in IBM-PC versions and both are now ready for release. And SONIS has undergone similar testing and may be available by this time. Thus, like UCINET, all of these programs are now available to almost any user. Only SONET has, so far, not been adapted for micros. But a new expanded version of SONET has been produced and is available for mainframe applications where PL/I compilers are available.

The future of network computing can be read in the current trends. All the programs are moving in the direction of micro-computer implementation. At the moment this means that they will be slow. But the incoming generation of micros is introducing much faster processors and that problem should disappear soon. More important perhaps, current micro-computer operating systems impose serious limitations on the sizes of the data matrices they can handle. New operating systems that will eliminate this problem have been promised, but so far they have not appeared. When they are available, micro-computers will be able to process data set of a magnitude equal to that of those currently processed on mainframes.

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*Addresses at which available network analysis programs may be obtained:*

- SONET -- Brian L. Foster, Dean, Graduate School, Arizona State University, Tempe, AZ 85287.
- GRADAP -- Inter University Project Group GRADAP, Technical Center FSW, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands.
- SONIS -- Institut fur Soziologie, Christian-Albrechts Universitat, Olshausenstrasse 40, D-2300 Kiel 1, Federal Republic of Germany.
- UCINET -- Linton C. Freeman, Program in Mathematical Social Science, School of Social Science, University of California, Irvine CA 92717.
- NEGOPY -- William d. Richards, Jr., Department of Communication, Simon Fraser University, Vancouver, BC, Canada.
- STRUCTURE -- Ronald S. Burt, Research Program in Structural Analysis, Center for the Social Sciences, Columbia University, New York, NY 10027.
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## RELATIONAL DATABASES, NETWORK ANALYSIS, AND THE REPRESENTATION OF SOCIAL SYSTEMS

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### Summary

*Adequate representation of social systems requires a data base in which data at different levels of the system can be represented simultaneously. Moreover, an adequate representation of the social relations at and between these levels will be indispensable for an analysis of the mechanisms through which social structures are linked with individual behavior in two essential ways: How do such structures result from individual behavior and how do such structures condition individual behavior? This requires a data base in which shifts of the unit of analysis can easily be made, data at different levels can easily be projected on other levels, networks at and between levels can be generated, characteristics of these networks can be linked with other characteristics (either as a dependent or as an independent variable), and from which files can be extracted for analyses within general statistical programs or special network programs. It will be demonstrated that relational databases have these facilities and that the social network program GRADAP has a database structure that makes shifts from and to such a relational database straightforward.*

*Keywords: relational databases, social network analysis, software for social networks analysis, corporate networks, interlocking directorates.*

### 1. Introduction\*

For a long time computer applications in the social sciences were confined to statistical computations. Most statistics require independent observations over a large number of entities. As this requirement was met in social science research at the individual level, computer applications in social sciences got a very strong flavor of large scale survey research. The most efficient representation of the data in such cases is a rectangular data matrix, in which the rows represent persons and the columns variables. In the early seventies one of the major extensions of computer applications was the possibility to document such a data matrix internally and to do all types of data manipulations on it, such as selections, recodes and computations of composed indices. This was the major contribution of computer packages such as SPSS and OSIRIS, giving a much larger group of social scientists access to relatively sophisticated data analysis techniques. But the data had to remain in a rectangular form. This requirement became so forceful, that social scientists became accustomed to transforming their theoretical questions into problems that fitted into such rectangular representations. Maybe, a number of them became even so familiar with it, that they simply forgot the necessary simplifications resulting from such a projection. Other scientists, however, were forced to make all sorts of difficult data transformations and to implement inefficient data representations in order to project more complicated data structures into this form. In other words, social scientists were forced to project complicated social systems into rectangular data representations with similar consequences as living in a two-dimensional subspace of the three dimensional real world, as described in Flatland (Flatland, 1982)

A second serious problem with this type of data representation is the difficulty to update the data. Most social systems change in certain parts and gradually, but not in total. The rigid representation required, however, at any new moment of data collection, a complete new data matrix with all entries filled in again, changed or not. This made social science research much more static than desirable and necessary.

In recent years the possibilities of computer applications in the social sciences have been drastically extended to almost all phases of social science research. In the early stages of a project computer searches of literature enables social scientists to get a much more complete overview of previous research and publications in the field. Tools such as SMALLTALK and SIMULA make it possible to elaborate theories in a more systematic way and to investigate (unforeseen) outcomes of different rival theories with computer simulation techniques, subsequently directing empirical research to such differentially predicted outcomes. Handheld computers and software for designing and administering surveys and telephonic interviews are in stage of development, in which widespread use is to be expected in the next few years. New statistical techniques have been developed which are more adequate for social science data, because they account for the low measurement levels of most social science data. One can think particularly of loglinear analysis techniques for nominal data, non-metric multidimensional scaling techniques, and latent traits models for dichotomous data. Expert systems to advise social scientists on the choice of techniques, most adequate for the data at hand and the types of questions he or she poses, are to be expected in the somewhat further future. Also the interpretation of the outcomes of analyses might well be



facilitated by expert systems in the nineties. Furthermore, within a very short period micro-computers have invaded the whole field of text processing of reports on social science research.

Among the above rapid developments of computer applications in the social sciences is the availability of more flexible data bases. This is of primary importance because one of the most fundamental problems in social sciences is focussed on the question of how individual behavior and social phenomena are related to one another. The thesis that the explanation of social phenomena is a central task of sociology is widely accepted. Explanation of social phenomena requires, however, shifts of units of analysis. First of all, most social systems have many different levels at which social phenomena can be located, and they are not linked with one another in a straightforward way. Secondly, an adequate explanation of social phenomena will be impossible unless, at a certain point in the explanatory process, individual behavior is linked with these social phenomena. This is the immediate consequence of the fact that social phenomena, in one way or the other, result from individual behavior, behavior which itself in its term is conditioned by these social phenomena (see e.g. Raub, 1982). Relational data bases contain the facilities to represent phenomena at different levels and to link them with one another.

The basic idea behind a relational database is very simple. A relational database is a database that is perceived by its users as a collection of tables (and nothing but tables). Instead of one rectangular data matrix we have now the possibility to define many of them. Between the different tables no relations are explicitly defined. We can link the information in different tables, however, because certain values are the same in different tables.

With an example of police-suspects encounters Brent (1985) shows the possibilities of relational databases to represent within one database social science data of different units of analysis. He shows how in such a database characteristics of officers can be represented in one table, those of suspects in a second table, those of encounters in a third table, and how easily data from these three tables can be combined through different operations. The latter can be done, because the same identifications for the officer and the suspect are used in the encounters' table as in, respectively, the officers' table and the suspects' table.

Sonquist (1985) shows the possibilities of relational databases for the representation of social networks and illustrates this by elaborating how the basic tables for a network of interlocking directorates should be defined in a relational database.

In this paper, I will build directly upon their ideas and elaborate them by showing how from a limited number of basic tables in a relational database all types of networks can easily be generated, submitted to the network program GRADAP (Sprenger et al., 1988), and how, finally, these results can be linked to other characteristics in a straightforward way. This seems useful, because the article by Brent does not deal with network data, and the article by Sonquist does not make clear which networks can be generated from his basic tables and how easily that can be done. Moreover, it is useful because very powerful relational database systems, like INGRESS and ORACLE, as well as the network program GRADAP are available on IBM-PC's by now, a combination that gives to social scientists the opportunity to analyze large social networks without the support of local programmers.

In the next section, as an example, the different perspectives in corporate networks are given, showing how the unit of analysis is shifted from one perspective to the other. In section 3, first, relational databases are defined. Subsequently, for the example of corporate networks, the basic tables are given. In section 4 it will be shown how adequate such a representation is for an integrated and dynamic analysis of such a social system and how easy that is; demands that presently are forwarded in the literature in that field (see section 2).

Please replace the concrete example for any other social system consisting of organizations with their characteristics and mutual relational structure at the meso level at which individuals operate at the micro level with their characteristics, mutual social relations and relations towards the organizations. As will be demonstrated, also information on the macro level can be added. This makes it possible to relate structures to characteristics at the macro level in a comparative project of social systems. A few examples of such possible applications will be given in the concluding section.

## 2. An example: main perspectives and units of analysis in corporate structure research.

An interlock is the social relation between two enterprises that is created when one person is a member of the highest decision making boards in each enterprise. Such a person is termed a multiple director. Interlocks have been the subject of political debate and research from the beginning of the century (Fennema and Schijf, 1979). Although the question of economic power was predominantly central to the subject, a common perspective on analysis and interpretation did not exist. A first major distinction between studies of economic power refers to the chosen unit of analysis: the company or the person. Besides, different levels of analysis have been chosen: certain studies of economic power concentrate on the separate agents, whereas others on the system as a whole. The four

major perspectives on economic power result from a cross-classification of these two dimensions, as is shown in Figure 1.

Level of analysis	Units of analysis	
	Enterprise	Person
Agent	Organizational perspective	Social background perspective
System	Interorganizational perspective	Class Hegemony perspective

Figure 1: Perspectives of economic power  
Source Scott, 1985, 3.

The theoretical interpretation of interlocks and the role they play in studies of economic power are mainly determined by the chosen perspective.

In studies that focus on the enterprise as unit of analysis (the first column of Figure 1) interlocks are primarily seen as instruments of enterprises. Fundamental differences, however, exist on the question of what they are primarily used for.

The weakest interpretation is given by resource dependence theorists who emphasize the use of interlocks by enterprises to reduce uncertainty in their environment. The number of interlocks is therefore used as an independent variable to predict the effectiveness of the company (cf. Pennings, 1980). Other studies in the resource dependence theorem not only look at the agent level, but are concerned with network characteristics as well. This is particularly the case with the studies of Burt (1979, 1983; Burt et al, 1980) who relates intensity of interlocking to market and profit constraints.

Such an orientation towards the network as a whole is also present in studies that interpret the shaping of the overall network in terms of financial control. This stronger interpretation of interlocks is mostly derived from the structure of the network, particularly the central position of financial institutions in it (Mintz and Schwartz, 1981, 1985).

In studies that focus on the person as the unit of analysis (the second column in Figure 1) interlocks are primarily interpreted in the intraclass perspective. In social background studies the number of positions of a person is interpreted as an indicator of his or her "social capital" and is related to other personal characteristics (Bourdieu and de Saint Martin, 1978; Vinke, 1961). In "class hegemony" models interlocks indicate the cohesiveness of the dominant class (Domhoff, 1967, 1970, 1983; Useem, 1979).

Certainly Figure 1 clarifies the different perspectives in studies of economic power, but it obscures the fact that economic power is generated by a process in which organizations as well as persons, play an active part. Whether interlocks are studied from the perspective of the organization or at the personal level, it is of utmost importance to realize that they are created by the distribution of organizational positions over persons. The interorganizational perspective stresses the active role of the organization in the selection of persons on the top levels and assumes that the basic structure of, and the dynamic behind the network, is primarily determined by organizational demands and possible external constraints. Their analyses are therefore based on the network of interlocking directorates in which the organizations are the units of analysis. From the intraclass perspective, the persons who are shaping the network determine the dynamics behind the network. The enterprises on whose boards they sit are instrumental. Seen from this perspective, a network between persons as the unit of analysis seems to be more appropriate.

The debate between the adherents of the interorganizational and the intraclass perspectives about the primacy of the organization or the person as the main actor can not be solved on the basis of a cross-sectional analysis of the networks of interlocking directorates. The results of such analyses give sufficient arguments for both sides to maintain their positions (Stockman and Wasseur, 1985). The impossibility to relate the results of network analyses to the basic mechanisms that shape the networks point to the investigation of the dynamics of the network. Earlier studies confined such an analysis completely to the stability of the lines in the network, each of

them choosing a somewhat different approach (Helmets et al., 1975; Koenig et al., 1979; Ornstein, 1980, 1982, 1984; Palmer, 1983; Palmer et al., 1986; Stearns and Mizruchi, 1986)

Of course, stability of ties is an important question. If certain types of interlocks exist that are relatively stable, they can be seen as positive constraints around which the rest of the network is being structured, taking into account a number of negative constraints as well, such as the incompatibility between competition and direct interlocks. However, within the boundaries of such positive and negative organizational constraints the dynamics in the networks are located in the process in which directors are recruited and acquire multiple positions. If we are able to infer the basic mechanisms behind that process we will have an understanding, not only of the dyadic stability in the network, but also of the mechanisms that explain the observed combination of low stability at a dyadic level and high stability in the overall pattern of the network. If we carefully scrutinize which units of analysis have been considered in the above perspectives, we can distinguish many more than the two in Figure 1, namely:

- corporations (with their economic characteristics);
- directors (with their personal characteristics);
- directorships, i.e., pairs consisting of a corporation and a director (with their types of positions);
- pairs of corporations (with their whole pattern of relationships, such as financial and economic relations, personal interlocks);
- interlocks between corporations (with their stability);
- economic branches (with their market structure)
- pairs of branches (with their in/output data);
- branch-corporation relationships (activities of corporations in different branches)

In the next section it will be shown how the relevant data can be represented in a relational database, from which in section 4 all relevant networks can be generated.

### 3. Relational databases and the basic tables for the corporate network example

The original rectangular matrix of cases by variables has been extended in three different ways on the basis of which three fundamental types of data structures can be distinguished.

In a hierarchical data structure units of analysis at several levels can be represented, but each unit at a lower level can be assigned to only one unit at a higher level (the so-called one-to-many relation). For example, each household may consist of a varying number of persons, but each person is assumed to belong to only to one household (which is of course true only by a rigid definition). Variables or properties may be defined for the units at each level. An example of a database that supports a hierarchical structure of the data is SPSS-X.

The second type of data structure is the network. In a network each unit of analysis can be connected with any other units of analysis (the so-called many-to-many relation). Depending on the flexibility of the database, variables can be connected to the units of analysis and to the relations between the units.

The third and most flexible data structure is the relational one. It shares with the network the possibility of linking many units of analyses to many others. However, whereas in the network structure such links should be explicitly defined and present, they can be generated in the relational database, even if they were not designed when the database was created.

As we stated in Section 1, the basic idea behind a relational database is very simple. For the user it is just a collection of tables (and nothing but tables). Instead, of one rectangular data matrix of cases and variables, we have now the possibility to define many of them.

Let us return to the example of the corporate system (Table 1). A first table might consist of properties of the corporation under study, such as their names, headquarters, main branch and economic performance (profits etc.). The second table contains information on the person (e.g., their full names, age and sex). The third table lists which persons are on the boards of the corporations and whether they have an inside or outside position on that board.

Between the different tables no relations are defined. We can link the information in different tables, however, because certain values are the same in different tables. So, we are able to link the information of Chase in table *corp* with the information on C. E. Smith because these two are linked in table *position*, i.e. the value *c1* in table *corp* is linked to *p1* in table *person* through their appearance in the first row of table *position*.

Table 1. Relational data base consisting of three tables

Table corp

corpcode	corpname	headquarter	main branch	profits	turnover
c1	Chase	New York	bank	xxx	yyy
c2	IBM	New York	electronics	www	zzz

Table person

person#	persname	age	sex
p1	C.E. Smith	45	m
p2	K. Jones	64	m

Table position

corpcode	person#	type
c1	p1	i
c1	p2	o
c2	p1	o

If the tables are not linked with one another, what makes it a relational data base? It should be realized that the concept relation is used here in a specific way, namely as a mathematical relation: Each table is a relation. Relation is just a mathematical name for a table (if certain conditions are fulfilled). We should not confuse this mathematical concept with the concept of relation as it is used in social networks. If we intend the latter, we will always speak of a social relation.

The above example consists of, therefore, of three relations. The relation **corp** consists of six attributes (or columns), the relation **person** of four and the relation **position** of three. Each relation should have a unique identifier, called primary key, that uniquely defines each row. Such a primary key may be one attribute (in table **corp**: corpcode; in table **person**: Person #) or a combination of attributes (in table **position**: corpcode and person# together). A relation is defined by its attributes; primary keys are underlined. A short notation of the above tables is therefore:

- corp**: (corpcode, corpname, headquarter, main branch, profits, turnover)
- person**: (person#, persname, age, sex)
- position**: (corpcode, person# , type)

For the proper design of a relational database two concepts are of utmost importance: the already introduced concept "primary key"; and "functional dependency". The idea of functional dependency is that if you know the value of one variable (usually the "primary key") for a row, the value of another variable is completely determined. These two concepts are involved in the different steps to "normalize" a data structure. Five steps are considered in the literature, but the first three are the most relevant and considered here.

The first and most fundamental step involves elimination of repeating variables in a table. For example a table in which for each corporation its directors are listed, one after the other, is not allowed. The attribute 'person#' would then have more than one value, which is not allowed. All data values should be atomic, that is, at every row-and-column position in every table there should be always exactly one data value, as is the case in the table **position**. If this is the case, the data are said to be in their first normal form.

In the second step, the data are restructured in such a way that all attributes in a table are functionally dependent on the whole primary key and not on a part of it. If we would have defined the table **position** as position:(corpcode.person#, corpname, type), the attribute corpname is not functionally dependent on the whole

primary key, but only on the first part of it (corpcode). The reason for this requirement is of course that the corpname has to be repeated with all its directors. Relational data bases enable the user to define a data structure in which all attributes are stored at only one place in the data structure, which is convenient for storage space, but particularly for entering and updating the data base. If the data base is in its proper form, a change in the value of an attribute will never create inconsistencies because you forgot to change it at another place in the data base.

To illustrate the third step in the normalization procedure, I will extend the example to represent data over several years. This enables me in the next section to illustrate the possibilities of several dynamic analyses as well. Suppose we have economic performance data and board membership data for several years. We might be inclined to extend the table corp in the following wrong way:

- corp: (corpcode, corpname, headquarter, main branch, year1, profit1, turnover1, year2, profit2, turnover2, year3, etc...)

The main problem with such a table is that the values of a number of attributes (profit, turnover) are dependent on the value of another attribute that is not part of the primary key (year).

The third step in the normalization procedure involves the elimination of this type of dependencies. This can be done by defining the following two tables:

- corp: (corpcode, corpname, headquarter, main branch)
- ecstat: (corpcode, year, profit, turnover)

Such a solution might well be chosen for the board position too. However, as most board positions remain the same for several years, a more economic solution would be the following:

- position: (corpcode, person#, start, end, type)

Now only changes in board membership have to be recorded instead of entering all board positions each year.

As we have seen in section 2 some studies in the field of corporate structure relate corporate interlocks to characteristics of the branches. This requires the addition of tables with branch characteristics and input-output data between branches. Moreover, corporations might well operate in different branches. This requires the deletion of the main branch characteristic in the corp table and the addition of a branch membership table in which also the rank position of the corporation in the branch can be given.

Of course, other types of social relations might be added, such as club membership -- which is strictly equivalent with board membership -- or relations between corporations such as more or less permanent financial relations or, if known, yearly based economic transactions.

If these relations are added, the following data structure emerges:

- corp: (corpcode, corpname, leagal-status)
- club: (club#, clubname,...)
- branch: (branch#, branch name)
- person: (person#, persname, birthyear, educlevel, sex,...)
- branchstructure: (branch#, year, concen-ratio, size)
- ecstat: (corpcode, year, profit, turnover,...)
- inoutput: (branch1#, branch2#, input, output)
- branchposition: (branch#, corpcode, year, rank)
- ectrans: (corp1#, corp2#, year, type, size)
- finrel: (corp1#, corp2, start, end, percent)

- **position:** (corpcode, persons#, start, end, type)
- **clubmbr:** (club#, person#, start, end, type)

With this data structure 100 percent of all past or present research in the field of corporate structure is covered, because all relations that have been the subject of study can easily be derived from those tables. This will be demonstrated, very easily, in section 4. Moreover, dynamic analyses can be performed, that have not yet been studied because of the complexities of deriving them from less flexible data structures. This will also be demonstrated in section 4. Section 5 shows how the data structure of GRADAP makes it possible to submit the resulting tables to analytic procedures for network analysis, and how the resulting network characteristics can easily be added to the other data in the relational database.

#### 4. Retrieval of networks from the relational database.

Let us consider how the different networks can be generated from the above data structure. Of course, the possibilities of a relational data base are determined by the facilities of the interface between the data base and the user. Such facilities are contained in the language that the user can use to communicate with the data base and to extract information from it. The standard language for relational data bases is SQL ("Structured Query Language"; the acronym is usually pronounced "sequel"). As the language is somewhat more self evident, which is imperative in such an illustrative article as the present paper, I will give the examples in QUEL ("Query Language"), the language that was developed and is still supported by the relational data base systema INGRES.

New tables can be derived from the existing ones by the RETRIEVE statement in QUEL. To generate a table of interlocking directorates between corporations in a certain year X, we first do a simple selection of all board members in year X from the table position. We thus create a new table posX by the following expression:

```
RETRIEVE INTO posX (position.corpcode, position.person#, position.type, year = "X")
WHERE position.start <= X
AND position.end > X
```

The new table consists of three new attributes that are derived from the table position (namely corpcode, person# and type) and the constant X.

After WHERE the selection criteria are specified. Such clauses may well be based on prior computations. For example, if we want to have only the board positions of board members with four or more positions, we can include a COUNT statement in the WHERE statement:

```
RETRIEVE INTO multposX (posX.all)
WHERE COUNT (posX.corpcode BY posX.person#) > 3
```

The table will contain all the attributes in table posX, but only for board members with four or more positions. Such information can be joined with information from other tables, e.g., the name of the corporations and the names of the persons in order to get a nice overview of their positions. If such an overview is not done in a new physical table, but only in a virtual one (called a VIEW) the following statement gives the desired result:

```
DEFINE VIEW multdirX (multposX.corpcode, corp.corpname, multposX.person#,
                    person.persname, multposX.type)
WHERE posX.corpcode = corp.corpcode
AND posX.person# = person.person#
```

This is an example of a so called natural join, because attributes in two or more tables are linked with one another, if the value in a shared attribute (e.g. corpcode) is the same. Thus the corporation's name from the table corp is added to a row in the table multposX, if its name is connected with the same corpcode. The same is done for the name of the person from the table person.

A simple list of all multiple directors with four or more positions in year X with all their characteristics can be obtained by a natural join between the tables `person` and `multposX`, suppressing a repetition of the same person name by the keyword `UNIQUE`:

```
RETRIEVE UNIQUE (multposX.person#, person.all)
WHERE multposX.person# = person.person#)
```

Of course club membership of these persons can easily be associated with this table by a natural join with the table `clubmbr`.

A natural join can also be performed on a table with itself. Suppose we have two copies of the same table, the first one called `first` and the second one called `second`. We can now do all operations on the two copies as if we had two different tables. This is the case in the following example with which all interlocks between any two corporations in the year X are created. Each row in the resulting table consists of the code of the first corporation, that of the second (with `corp1#.corp2#` to avoid that each interlock is taken twice and to prevent that a corporation is connected with itself through its directors), the code of the person who carries the interlock, his/her type of position in the first corporation and that in the second, and finally the constant X (year). The table contains only pairs of corporations that have at least one common board member. Each pair is repeated as many times as the number of common board members. The primary key in the new table will therefore be `corp1#.corp2#.person#`. The desired table, called `interlockX`, is obtained by the following simple statement:

```
RANGE of first is posX
RANGE of second is posX
RETRIEVE INTO interlockX (corp1# = first.corpcode, corp2# = second.corpcode,
                          person# = first.person#, type1 = first.type, type2 = second.type,
                          year r= first.year)
WHERE first.person# = second.person#
AND first.corpcode second.corpcode
```

Replacing the `person#` by the name of the person and deleting the attribute `year`, we see the following table of interlock relations between corporations:

corpcode1	corpcode2	persname	type1	type2
US100	US318	ABBOUND.A.ROBERT	2	1
US141	US152	ADAMS.CHARLES.F	2	2
US023	US089	AGEE.WILLIAM.M	1	2
US045	US125	ALDEN.VERNON.R	2	2
US125	US315	ALLEN.JR.IVAN	2	2
US031	US316	ALWORTH.JR.ROYAL.D	2	2
US053	US130	ANDERSON.CHARLES.A	2	2
US156	US344	ANDERSON.ROBERT	1	2
US086	US141	ANDERSON.ROBERT.B	2	2
US020	US318	ANDERSON.ROBERT.O	1	2
US061	US103	ANDERSON.ROGER.E	2	2
US061	US313	ANDERSON.ROGER.E	2	1
US103	US313	ANDERSON.ROGER.E	2	1

Whereas the above table contains the interlock relations between the corporations as units of analysis, Johnson and Mintz (1987) analyzed the person network in which two persons are connected with one another, if they sit together on two boards. Such a tie between two persons indicate a very strong type of cooptation. That

table can be generated very easily from the table `interlockX` by a join of the table with itself over the two corporations:

```
RANGE of first is interlockX
RANGE of second is interlockX
RETRIEVE INTO coopX (person1# = first.person#, person2# = second.person#,
                    corp1# = first.corp1#, corp2# = first.corp2#, year = first.year)
WHERE first.corp1# = second.corp1#
AND first.corp2# = second.corp1#
AND first.person# < second.person#
```

Replacing the codes of the persons by their names and deleting the year, each row of the table contains the following information:

TABLE IS coop

name first person aymond.alphonse.h
-------------------------------------

name second person bodman.henry.t
-----------------------------------

code of first corporation US115

code of second corporation US336

Again club membership can easily be associated with these strong organizational links. Shared club membership can be obtained by a natural join on the table `clubmbr` with itself to generate a table in which each row contains a shared membership for a pair of persons. Subsequently, that table can be joined with the above table to investigate the overlap between the two types of relations.

As we stated in section 2, at present a dynamic analysis of the network structures is emphasized. Stability of interlocks over time can easily be studied by generating a similar second table of interlocks for year Y as the above table `interlocksX` and a subsequent join of these two tables. Both continuity of interlocks by the same persons as reconstitution of interlocks by new multiple directors can be investigated. As such a table contains information on the combinations of the types of positions at the two moments, such a stability analysis can be differentiated for different types of interlocks, and all transition probabilities between different types of interlocks can be investigated.

More fundamental information on the dynamics behind the networks will be obtained from a table in which a link from the first corporation to the second one indicates that the multiple director first obtained his or her position in the first corporation before he/she was nominated in the second corporation. Such a table can be derived in the following way:

```
RANGE of first is position
RANGE of second is position
RETRIEVE INTO sequence (corp1# = first.corpcode, corp2# = second.corpcode,
                    person# = first.person#, type1 = first.type, type2 = second.type,
                    start1 = first.start, start2 = second.start)
WHERE first.person# = second.person#
AND first.start < second.start
(AND first.end < second.start)
```

If the third condition is added, the table contains only lines if the second position was obtained while the first one was still occupied. If the third condition is deleted, a person may have lost his/her first position before



might be used to investigate whether a position in certain (types of) corporations is a prerequisite for or facilitates the acquisition of a position in other corporations. Secondly, the analysis can be oriented towards the different combinations of types of positions: is the occupancy of a certain type of position a prerequisite for that of other positions? The first type of analysis has never been performed, whereas the results of the second type analysis will be published soon (Sokman et al., forthcoming). They reveal that indeed a (former) inside position in one of the large corporations or financial institutions is almost a prerequisite to obtain many outside positions in other corporations. Of course, club membership can be taken into account as well to investigate whether clubmembership precedes positions in corporate boards or results from them. Such an analysis may finally clarify the debate on the importance of social ties for interorganizational ones.

The above illustrations are not meant to give a systematic introduction to operations on relational data bases, but they serve as illustrations of the possibilities of these databases to generate all kinds of social networks from a few basic tables in which such social relations were not explicitly defined. The illustrations should be sufficient to give the reader at least the idea how he or she can relate interlocks to other types of relations among corporations, to outputs of the corporation, to positions within branches, and to in/output relations between branches. Emphasis has been given to the special relational operation JOIN as a very powerful operation to generate tables with social relations, but other operations are important for other types of information retrieval.

The AGGREGATE operation is one of them, touched upon when the COUNT statement was used within the WHERE clause. Other main operations are the traditional set operations as the UNION, INTERSECTION, DIFFERENCE and PRODUCT of two relations, and special relational operations as SELECTION, PROJECTION, and DIVISION. Relatively simple introductions are given in Martin (1977), Mayne and Wood (1983), and Date (1987), whereas Date (1983, 1986) and Ullman (1982) are adequate for more sophisticated readers only.

## 5. The data interface between GRADAP and relational database systems.

The data structure of GRADAP consists of two tables. The first table contains the attributes of the points. It is called the pointdata matrix. The table corp in Table 1 is a typical example of such a pointdata matrix. The primary key of the table should be used as identifier of the points in GRADAP (depending on its character to be entered as the values of the attribute POINTNUM, POINTNAM, or POINTLAB). The second table is a table whose rows consists of the lines of the network and whose columns are the attributes that are defined on the lines. GRADAP assumes that the attributes TAIL and HEAD refer to the primary keys of the points that are the begin- and endpoint of the line. This gives a straightforward data interface between GRADAP and relational databases. Let us give a few examples.

The network of interlocking directorates can be analyzed in GRADAP by submitting to GRADAP the tables corp and interlockX. All kinds of network analytic procedures can be performed on this network. For example, for each point different centrality measures can be computed, which might be repeated for different networks on the basis of further selections on types of interlocks. The latter can easily be done by GRADAP, because GRADAP can use the values of attributes of the lines to make selections. The results of these analyses can be written to a file, which can be added to the relational database.

In a next step the cooptation network between persons can be submitted to GRADAP by entering the table person as pointdata matrix and the table coopX as linedata matrix. Again the results of e.g., a point centrality analysis can be written to file and added to the relational database. A join of the network analytic results of the two networks with the table posX makes it possible to analyze the relation of centrality of the person in the cooptation network with that of the corporations in the interlock network, something that seems of large theoretical importance, but was too complicated to be ever done.

## 6. Discussion and other applications

Many systems claim to have a relational data base, but only a few really have one. The first relational database was DB2 of IBM (which resulted in the choice of SQL as the standard language for relational databases). The two most well known and powerful relational data base systems, operating both on PC's and mainframes, are ORACLE and INGRES. A data base with many relational facilities is SIR. Although the database of SAS is much more flexible than that of SPSSX, it can not be classified as a relational database. The same holds for smaller database systems like DBASE III.

Let us finish with a few other possible applications of relational databases in the social sciences.

At present a relational database is in development for the analysis of scientific output of Dutch research groups in the social sciences. This database contains tables with data on research groups, on individual researchers, authors, publications, and media. In similar ways as described above, it will be possible to relate scien-

tific outputs to characteristics of persons and research groups. Through an analysis of the links between research groups and media, a further differentiation of research groups can be made according to quality and main scientific orientation. If such a database is linked with citations, the same network aspects, which were prominent in the main example of this paper, become applicable within the context of this second example as well. A last and very straightforward example of the applicability of relational databases lies in the field of community studies. Most community studies are based on extensive qualitative research within the community, describing the structure of the community in its different aspects. If systematic data have been collected, it refers often to the perceptions and attitudes of individuals. Relational databases enable one to relate such data at the micro level to social networks among the individuals, to their participation in local organizations, to interorganizational connections. In a comparative perspective also the characteristics at the macro level can be added to the database.

The above examples should give social scientists enough information about the relevance and analytic possibilities of relational databases for quite different applications. Moreover, at present user-friendly software is available for anyone who is willing to use it. For social scientists flatland should belong to the past therefore.

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## NETPAC VERSION 1.0

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NETPAC Version 1.0 is a collection of very fast Pascal programs for the analysis of network data. Although NETPAC shares many features with its predecessor AL (Borgatti 1985), all of the analytic routines have been rewritten from scratch using the latest algorithms and data structures available in the combinatorial literature. The result is a set of programs that in some cases run an order of magnitude faster than current standards.

This achievement, however, comes at a certain cost. Whereas the source code for such packages as UCINET is so transparent that even non-programmers can read it and understand how things are computed, the NETPAC source requires greater programming experience to comprehend. Some of the reasons for this are: (a) extensive use of recursion, (b) dependence on certain features of modern languages such as records, pointers and sets, (c) use of high level data structures like stacks, queues, sparse matrices and true linked lists, and (d) optimized algorithms that do not necessarily approach things in the most obvious way. Whereas the UCINET source code may be used to teach students the detail of network analysis (as it did me), the NETPAC source code probably may not.

Another cost of the NETPAC design philosophy is the size of problems it can handle. NETPAC is limited to networks of up to 255 actors. A related restriction is that, for the most part, edges in valued networks are limited to integer values between 0 and 255. (This restriction does not extend to the data manipulation module, which is designed to handle real values.)

NETPAC is organized as a collection of modules tied together by a central menu, as shown in Figure 1. The user chooses the module of interest by using the cursor keys to move from choice to choice. As he or she does so, a short description of the choice pops up. A choice is selected by pressing ENTER, or by typing a key letter (usually the first letter of the module name). Each module is actually implemented as a separate program, allowing the user the choice of executing modules directly from DOS or from the main NETPAC menu. Within a module, the user first specifies one or more datasets to work on, then chooses the specific analytic technique of interest.

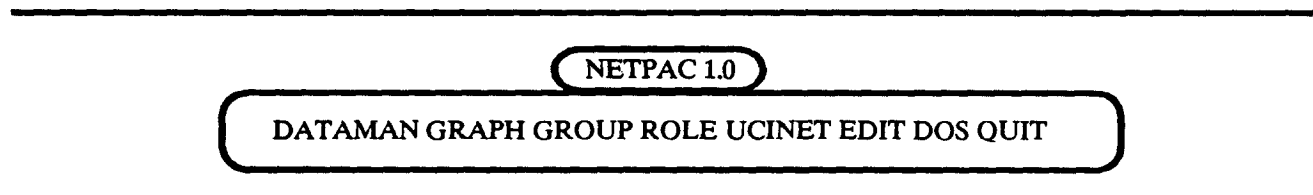


Figure 1. NETPAC main menu.

Datasets must be in UCINET 3.0 format, or a special NETPAC format called "DL", or they must be raw data files containing nothing but data. The NETPAC programs automatically sense the type of dataset and read it accordingly.

The following modules are available in version 1.0:

- GROUP Find cohesive subgroups (e.g., cliques, components).
- ROLE Find role structure (e.g., regular equivalence, orbits).
- GRAPH Graph theoretic routines (e.g., spanning trees, DFS).
- DATAMAN General data manipulation/transformation/display.
- UCINET Access to the UCINET 3.0 collection of programs.

A detailed description of each module follows.

### GROUP

The GROUP module consists of a collection of routines designed to find cohesive subgroups. The module is organized around a central menu, which is shown in Figure 2.

To find sub-groups, the user must first choose GET to read a dataset from disk into memory. Having done that, the user might choose ANALYSIS (to select a group finding algorithm) or decide to SYMMETRIZE,

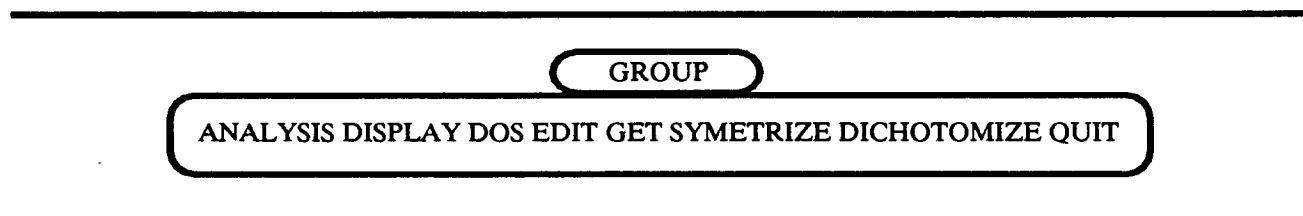


Figure 2. Main menu for the GROUP program.

DICHOTOMIZE or DISPLAY the graph first. Selecting ANALYSIS yields the list of algorithms shown in Figure 3. A brief description of each option is as follows:

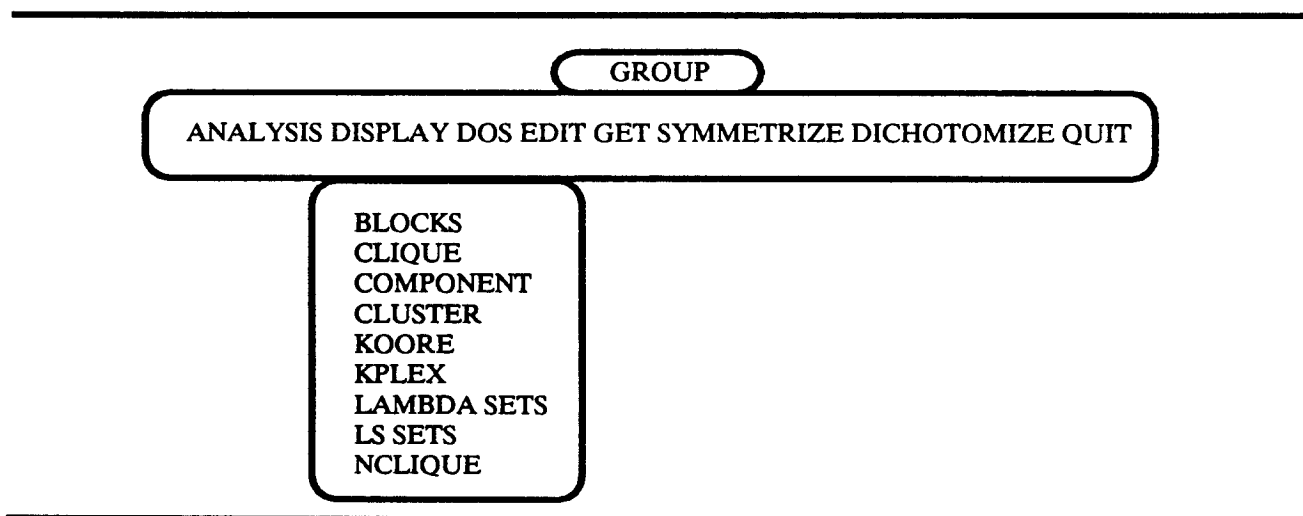


Figure 3. ANALYSIS submenu for the GROUP program.

<b>BLOCKS</b>	Find bi-connected components. That is, find maximum nonseparable subgraphs. According to Harary (1972), blocks are the “fragments of a graph held together by its cutpoints”.
<b>CLIQUE</b>	Find Luce & Perry (1949) cliques. Uses the Bron & Kerbosch algorithm, which is the fastest known.
<b>COMPONENT</b>	Partition points by strong, weak, or connected components.
<b>CLUSTER</b>	Average link clustering of geodesic distances or counts.
<b>KOORE</b>	Hierarchical partitioning of points based on Seidman’s (1983) K-cores.
<b>KPLEX</b>	Find Seidman & Foster’s (1978) k-plexes via an original algorithm.
<b>LAMBDA</b>	Hierarchical partitioning of actors based on Luccio & Sami’s (1969) LS sets (originally known as “minimal groups”). Original algorithm is considerably faster than the current standard.
<b>NCLIQUE</b>	Find Luce’s (1950) and Alba’s (1973) n-cliques. Based upon the Bron-Kerbosch algorithm.

All of the routines produce some kind of output on the screen (which may be redirected to printer or file), as well as creating output datasets in UCINET 3.0 format. The partitioning algorithms produce dendograms on-screen and two datafiles -- one for recording the partitions and another for recording sets of points. A sample dendogram from the LS program is shown in Figure 4. The clique-based programs produce lists of cliques which are both saved in a raw data file and printed on screen.

---

Actors	
Lambda	0 0 0 0 0 0 0 0 1 11
	3 1 2 4 6 7 5 8 9 0 12
<hr/>	
3	xxxxxxxx xxxxxxxx . . .
2	xxxxxxxxxxxxxxxxxxxx xxxxxxx
1	xxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

Figure 4. Sample output from the LS routine.

The ls-set program deserves special mention. It utilizes a new algorithm that is significantly faster than the previous standard set by Lawler (1973). The algorithm is based on a theorem stating that ls-sets are a special case of lambda sets (Borgatti and Shirey, forthcoming), which are markedly easier to compute.

Group-finding routines do not alter the data in memory, which then becomes available for processing with another routine. A useful thing to do between runs of any of the partitioning algorithms is to run DISPLAY. DISPLAY has two options: MATRIX or GRAPH. The MATRIX option permutes the rows and columns of the data matrix in accordance with the results of the most recently run partitioning algorithms, and displays the data as a pattern of ones and blanks. The GRAPH option draws the points and lines of a graph on the screen, assuming a suitable graphic adapter (CGA,HERCULES, AT&T, EGA, or VGA) is present. Three options are available for locating the point in space. One is a quick dirty and multidimensional scaling routine based on geodesic distances between points. Another is an ad hoc algorithm, also based on geodesic distances, that is better suited for directed graphs. The third option places all points in a circle. The order of points can either be determined by the user, or by an approximate solution to the traveling salesman problem.

Some of the other features of the GROUP module are EDIT and DOS. The EDIT option evokes an extremely fast full-screen editor used primarily to enter data. The editor is made by Borland International and is almost indistinguishable from that company memory resident editor, SideKick. It represents a significant improvement over the editor in AL.

The DOS option gives temporary access to DOS without leaving GROUP. It is primarily intended for executing DOS commands, but in fact may be used to run any program that does not need too much memory may be executed.

## ROLE

This module is issued to partition actors by role played in the network. The term "role" is used loosely here to mean something like "pattern of ties". Many of the models available in ROLE (e.g., structural equivalence, automorphic equivalence, REGE equivalence) are members of the family of regular equivalences, which may be thought of as satisfying the following general condition: two actors are equivalent (play the same role) if they are connected to equivalent others.

The main menu for ROLE is identical to that of the GROUP program (Figure 2). Choosing analysis, however, reveals the following options:

- |    |  |
|----|--|
| SE | Structural equivalence. Two actors are equivalent if they are connected to precisely the same others.  |
| AE | Automorphic equivalence. Two actors are equivalent if there exists an automorphism that maps one to the other. See Everett (1985) and Everett and Borgatti, 1988). |

MRE	Maximal Regular Equivalence (White & Reitz 1983). Two actors are equivalent if they are connected to equivalent others. This is the most inclusive of regular equivalences.
LRE	Local Regular Equivalence. Two actors are equivalent if they are regularly equivalent in the subgraph induced by their immediate neighborhoods. From Everett, Borgatti and Boyd (1988).
LAE	local Automorphic Equivalence. See LRE above.
IAE	Iterated Automorphic Equivalence. Computes a nested hierarchy of roles that may be thought of as roles of roles of roles ... to the limit. See Borgatti, Everett and Boyd (1988) for more information.
MAXCORR	A pattern-matching technique unrelated to regular equivalence. Particularly useful for weighted graphs. Descriptions of MAXCORR are found in the AL and UCINET manuals.

Most of the role programs produce a hierarchical partitioning of actors in addition to a derived similarity matrix, which is saved in an output dataset. Examples of both these outputs for the MRE program (similar to UCINET's REGE) are given in Figure 5 and Table 2 for the graph represented by Table 1.

Table 1. Directed graph.

---

										1
										1
										2
										3
										4
										5
										6
										7
										8
										9
										10

---


---

Figure 5. MRE analysis of the graph in Table 1.

The similarities computed by the MRE program are simply the number of iterations required to find that a pair of actors are non- equivalent. For binary data where each actor has the same number of ties, this measure correlates 100% with the standard measure computed by REGE program found in AL and UCINET. For data where points are not of equal degree, however, the measure computed by the UCINET and AL programs is somewhat confounded by degree, whereas the NETPAC measure is not. The NETPAC program is also free of a peculiarity

Table 2. MRE similarities based on graph in Table 1.

---

	0	0	0	0	0	0	0	0	0	1
	1	2	3	4	5	6	7	8	9	0
01	6	1	1	1	1	2	1	1	1	1
02	6	5	1	1	1	3	1	1	1	
03	6	1	1	1	3	1	1	1		
04	6	5	1	1	2	4	4			
05	6	1	1	1	4	4				
06	6	1	1	1	1					
07	6	1	1	1						
08	6	2	2							
09	6	5								
10	6									

---

found in all REGE programs descendent the original White and Reitz program, concerning the manner in which reciprocated ties are handled in directed networks. Essentially, these programs treat reciprocated ties as a single, special kind of edge in some circumstances, but as separate edges in and out in others. The result is that the programs do not always find the maximal regular equivalence (although this can be useful).

A useful feature of most of the ROLE routines is the ability to accept a starting partition. Thus one can make an initial classification of actors based on some theoretically useful variable (e.g. centrality or occupation), and then find the maximal regular equivalence consistent with that initial breakdown.

The ROLE programs allow an unlimited number of relations to be analyzed simultaneously.

## GRAPH

This module contains a miscellaneous collection of routines primarily intended to support an introductory course in graph theory. The main menu (not shown) is identical to that of GROUP and ROLE. The set of analytic routines available is as follows:

TOPSORT	Topological sorting of a directed graph.
MAXFLOW	Computes matrix of pairwise maximum flows between points. Input is either a binary matrix or a valued graph representing flow capacities of edges. Uses the well known Ford- Fulkerson algorithm.
SPANTREE	Computes a minimal weight spanning tree.
TSM	Computes an approximate solution to the traveling salesman problem using the method of simulated annealing (Press, Flannery, Teukolsky, and Vetterling, 19xx).
DFS	Depth first search. A fundamental method of visiting all nodes in a graph.
BFS	Breadth first search. Like DFS. Often used to compute shortest paths between points.
PFS	Priority first search. A generalization of DFS and BFS.
GEODIST	Computes the lengths of geodesic paths between all pairs of points.
GEOCOUNT	Computes the number of geodesic paths linking all pairs of points.
GEOPATH	Lists all geodesic paths in the network.



MAXGEO	Finds the set of maximal geodesics -- geodesic paths that are not contained in any other geodesic.
PARDEP	Computes the partial dependency matrix (Freeman1978).
GEOCUBE	Computes the three faces of the geodesic cube (Borgatti, forthcoming).
CENTRALITY	Computes geodesic centrality measures, such as closeness and betweenness (Freeman 1978), as well as eigenvector centralities (Bonacich 1972).

Certain graph routines, such as GEOCOUNT and CENTRALITY, are significantly faster than their counterparts in other packages due to the sparse matrix algorithms employed. Others, such as the spanning tree and traveling salesman routines, are commonly described in computer science and graph theory texts but are not generally available in coded form.

## DATAMAN

The most powerful module in NETPAC is perhaps DATAMAN. It is used to symmetrize, dichotomize, reformat, sort, rank, permute, subset, transpose, standardize, normalize, metricize, aggregate, and otherwise transform matrices. It can be used to perform simple arithmetic operations such as subtracting the mean from every row, dividing each column by the largest, or adding two or more matrices together. An inventory of capabilities is unfortunately not possible in the space available.

A key feature of DATAMAN is the ability to temporarily SELECT certain rows and/or columns for processing. For example, the user may SELECT rows 3 and 6, and SELECT columns 1 to 10, then ADD 5 to every value in the resulting matrix. The user may then "unselect", those rows and columns. The result will have been that all the values in a subregion of the matrix will have been incremented by 5, but values in the rest of the matrix will not have been changed.

A superficially similar but fundamentally different feature is the ability to either process matrices as a single entity, or process each row (or column) separately. For example, one might want to dichotomize a matrix by setting all entries greater than the mean to 1 and all others to 0. Using DATAMAN, one could either treat the entire matrix as a single object with a single mean, or dichotomize each row (or column) separately, computing a different mean for each one. Note that the mean, along with a variety of other common statistics, is a system variable computed automatically by DATAMAN and available for use in most arithmetic operations. Thus it is easy to divide rows by their largest value, or a matrix by its standard deviation, and so on.

Another key feature is the ability to exclude the diagonal from all operations, or conversely to exclude the off-diagonals (used to adjust the diagonal)

Missing data (coded as 1E37) are allowed and properly handled by all routines.

## SUMMARY

NETPAC is intended to provide fast versions of basic network analysis procedures in a menu-driven format. The pull-down menus with pop-up help lines make the program especially suitable for infrequent users, since there is nothing to memorize. The basic mode of operation (i.e., identify datasets to use, then run any or all analyses on that data) makes it easy to apply several different techniques on the same data without constantly typing in dataset names.

Although not described here, the NETPAC programs are accompanied by a powerful linear algebra package (a descendant of the matrix routine in AL), a consensual analysis package (Romney, Weller, and Batchelder 1986), and several multivariate programs including multi-dimensional scaling, clustering, factor analysis, optimal scaling, and regression.

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# ABSTRACTS

## Books

**Albrecht, Terrance L. and Maria B. Adelman. (1987?). *Communicating Social Support*. Newbury Park, CA: Sage. (310 pp.; \$28.00)**

This volume examines the theoretical relationship between social support and communication behavior. It also addresses the future directions in research and the practical applications in daily life. Topics covered include communication networks as structures of support; measurement issues; support from family, friends, and self-help groups; support and occupational stress; immigrant adaptation; and the diffusion of supportive information.

**Allan, Graham (1988?). *Family Life: Domestic Roles and Social Organization*. Oxford: Basil Blackwell. (256 pp.; \$19.50)**

Text combines recent feminist interpretations of domestic life with the traditional concerns of family sociology. It is particularly concerned with the impact that domestic roles have both inside and outside the home. Examines how their organization is structured by the broader social and economic contexts within which families operate. Looks at how the division of tasks and responsibilities between the genders and within the home is both shaped by the shapes, the divisions and inequalities that occur outside it.

**Cockburn, John (1987?). *Lonely hearts: Looking for Love among the Small Ads*. New York: Simon & Schuster.**

"It is not hard to understand why there is a boom in blind dating. What this book reveals is a world where work has come to dominate existence -- in its absence as much as its presence. You work too hard. You can't find work. In either case your social life diminishes, your isolation grows, your distaste for the rigamarole of the chat-up increases. Whether you answer ads or place them (there is a tendency to begin with the former before proceeding to the latter), you discover an art to making love which contemporary social networks preclude" (from review by Bill Greenwell) (\$9.95).

**Cook, Karen S. (Ed.) (1987). *Social Exchange Theory*. Newbury Park, CA: Sage. (248 pp.; \$14.95)**

A collection of recent work by exchange theorists covering several generations, this volume includes selections by P.M. Blau, J.S. Coleman, R.M. Emerson, and younger scholars who have followed their lead. Contents include network related topics as follows: Microprocess and macrostructure (P.M. Blau); Elements of interactor dependence/resources, interests, exchange networks, and preference configurations (P.V. Marsden); An exchange theoretical approach to defining positions in network structures (T. Yamagishi); Generalized versus restricted exchange: some implications for group process (M.R. Gillmore); Social exchange: a critical appraisal (J. Turner).

**Derlega, Valerian J. and Barbara A. Winstead (Eds.). (1986). *Friendship and Social Interaction*. New York: Springer-Verlag.**

A major goal of the volume is to develop theories and integrate research on the development and maintenance of friendships. The authors attempt to build bridges between social psychologists and other social scientists by presenting an interdisciplinary approach. The chapters present research on friendship based on a wide range of research methodologies, including laboratory research, longitudinal, naturalistic, and clinical studies. (290 pp.)

**DiMaggio, Paul J. (Ed.) (1987). *Nonprofit Enterprise in the Arts: Studies in Mission and Constraint*. New York: Oxford University Press. (370 pp.)**

The nonprofit organization is a site where multiple interests may collide, especially aesthetic goals with market concerns. This book traces the structuring of artistic business, identifying whose interests are served, providing examples of success and failure, and offering cross cultural comparisons. A specific focus is the historical separation between 'high' and 'popular' culture, especially immigrant culture, and the clash of class and status reflected in cultural organizations.

**Frick, Dieter (Ed.) (1986). *The Quality of Urban Life: Social, Psychological and Physical Conditions*. Berlin: de Gruyter. (262 pp.; \$34.95)**

This volume consists of theoretical and empirical evidence from research done by sociologists, psychologists and town planners from the United States, Great Britain, Italy and the Federal Republic of Germany. Includes a section on social networks, including: Introduction (R. Mackensen); Social networks and the quality of life (B. Badura); Social networks in urban neighborhoods (W. Sodeur); Network processes (J.C. Mitchell).

**Goldthorpe, J.E. (1987). *Family Life in Western Society: A Historical Sociology of Family Relationships in Britain and North America*. Cambridge: Cambridge University Press. (240 pp.; \$8.95)**

Goldthorpe presents a new approach to family sociology in western societies, focusing on two related questions. Why did we have a certain kind of family life at a specific time? Why did we have a certain kind of sociology of family life at a specific time? Based on a review of historical research and sociological studies, he shows continuity and change in family life over the centuries.

**Gouldner, Helen & Strong, Mary S. (1987). *Speaking of Friendship*. Westport CT: Greenwood Press. (185 pp.; \$29.95)**

Uses qualitative data from interviews with 75 middle- and upper- middle-class women to provide a picture of the meanings that women assign to friendships. To minimize elicitation of only idealized presentations of friendships, the researchers asked direct questions regarding difficulties in these relationships. Consistent with quantitative studies, the interviews show that status similarities and shared activities are important determinants of friendship. Nevertheless, the women in the survey tended to deny the importance of such structural factors, insisting that friends are chosen on personal grounds and not because of social constraints.

**Gurr, Ted R. and King, Desmond S. (1987). *The State and the City*. Chicago: University of Chicago Press. (242 pp.; \$14.95)**

Gurr and King argue that theoreticians from both the left and the right have underestimated the significance of state action for cities, that policies of the local and national state have a major impact on urban well-being. An historically based analysis using cross-national evidence, examines specific problems of urban policy in the United States and Great Britain. Includes a comparative analysis of 13 American cities, reflecting the range and impact of the state's activities at the urban level. The authors conclude that continued decline of most old industrial cities is the result of public decisions to allow their economic fate to be determined in the private sector.

**Hanneman, Robert A. (1988). *Computer-Assisted Theory Building*. Newbury Park, Ca.: Sage. (342 pp.)**

Theorists are traditionally divided into those who study 'structures,' 'processes,' or who use 'formal' languages. This work bridges the gap between these approaches, and proposes a "middle way" between purely verbal and purely mathematical models. It demonstrates how the use of specialized formal languages that lie between the every-day and the mathematical can build on the strengths of each, and become a method for stating formal theories.

**Havet, Jose (1988?). *The Diffusion of Power: Rural Elites in a Bolivian Province*. Ottawa: University of Ottawa Press. (156 pp.; \$18.00)**

Based on data gathered during field studies of Province Belisario Boeto in Bolivia, this book is a case study of that particular micro-region and its power structure. Looks at the daily life of the Bolivian peasant.

**Imamura, Anne E. (1987). *Urban Japanese Housewives: At Home and in the Community*. Honolulu: University of Hawaii Press. (191 pp.; \$18.00).**

This book explores what constitutes 'community' for urban housewives in Japan. Her hypothesis is the residence-related community is more important for the full-time housewife than for her husband, who works outside, often commuting a long distance to work. Imamura uses a combination of qualitative and quantitative data; interviews, participant observation, and a survey.

**Kim, Young Y. & Gudykunst, William B. (Eds.) (1988). *Cross- Cultural Adaptation*. Newbury Park, Ca.: Sage (320 pp.)**

Multidisciplinary and multisocietal in approach, this volume present current studies dealing with the process of cross- cultural adaptation of individuals. Cross cultural adaption refers to the complex process in which an individual acquires an increasing level of 'fitness' and 'compatibility' in a new cultural environment. It integrates

theoretical and empirical research endeavors psychology, communications research, and anthropology, and links studies of long-term and short-term adaptation.

**Kim Young Y. (1988). *Communication and Cross Cultural Adaptation: An Interdisciplinary Approach*. Avon, England: Multilingual Matters Ltd. (232 pp.)**

Research on cross cultural adaptation from anthropology, communications, psychiatry, psychology, sociology, sociolinguistics is synthesized in this volume. The theory presented is grounded in a systems perspective, emphasizing the stress-adaptation-growth dynamics of cross cultural experiences. Effective intra- and interpersonal communication activities are theorized as key to successful adaptation.

**Linsky, Arnold S. and Strauss, Murray A. (1986). *Social Stress in the United States: Links to Regional Patterns of Crime and Violence*. Dover, MA: Auburn House (180 pp.; \$24.95)**

The authors have developed a State Stress Index (SSI) that provides a quantitative measure of stress for each state and region of the United States. Their approach integrates sociological and 'life events' approach to studying stress. Findings indicate that the higher the level of social stress, the higher the level of health problems and crime.

**Mangen, David J., Bengston, Vern L., and Landry, Pierre H. jr. (1987). *Measurement of Intergenerational Relationships*. Newbury Park, CA: Sage (Focus Editions, Volume 92). (320 pp.; \$14.95)**

This work attempt to describe and measure family relationships between generations across the life-course. The authors report results of a research program focusing on intergenerational solidarity within families, based on a three-generation study design with 2,044 grandparents, parents, and grandchildren.

**Mann, Michael (1986). *The Sources of Social Power, Volume I: A History of Power from the Beginning to AD 1760*. Cambridge: Cambridge University Press. (566 pp.; \$18.95)**

This is the first part of three-volume work on the nature of power in human societies. The author identifies the four principal sources of power as being control over economic, ideological, military, and political resources. He examines the interrelations between these in a narrative history from neolithic times, through ancient Near Eastern civilizations, to the classical Mediterranean age and medieval Europe, up to just before the Industrial Revolution in England. He uses a model of "society" as consisting of a series of overlapping, intersecting power networks.

**Mitchell, J. Clyde (1987). *Cities, Society, and Social Perception: A Central African Perspective*. Oxford: Clarendon Press. (336 pp.; \$82.50) [!]**

One of the dramatic consequences of the impact of Western capitalism on those countries to which it has turned for raw materials and markets for its products has been the spectacular growth of cities. The social and theoretical difficulties raised by this process are the focus of this book, which is based on material assembled over 21 years of fieldwork in Africa. Reflecting a 'situational analysis' which concentrates on the detailed behaviour of African town dwellers, he describes: attitudes to town living; the way in which socio-economic status is reflected in occupational prestige; and the way in which ethnic identities are perceived and reacted to. Mitchell also draws a comparison between the rapidly growing cities and towns of the early United States, and very recent African cities.

**Mizruchi, Mark S. (1987). *Intercorporate Relations: The Structural Analysis of Business*. Cambridge: Cambridge University Press. (320 pp.; \$39.50)**

This is a compilation of work by scholars who have adopted a structural approach to the study of business. It argues that corporate behavior cannot be understood in terms of the actions of individuals alone, and that in order to understand how businesses operate, it is necessary to explore the relationships between them. It reflects the two major structural perspectives on intercorporate relations -- the resource dependence and social class views -- and includes essays on markets, money, and relations between corporations and cities; analyses of business structures in Europe, Latin America, Japan, and the United States; and a chapter on transnational relations.

**Paul, Mark J. (198?). *The Empire Builders: Inside the Harvard Business School*. London: Harrap. (303 pp.)**

An expose of Harvard's renowned "case system" and the methods the Business School continues to exert to extend its virtual monopoly of the business community. The truth about the cycle of consultation, chair endowment and directorships is explored and explains the perpetuation of its unrivalled hegemony.

**Phinney, Jean S. & Rotheram, Mary J. (Eds.) (1987). *Children's Ethnic Socialization*. Newbury Park, CA: Sage (Focus Editions, Volume 81). (330 pp.; \$14.95)**

This edited volume attempts to integrate existing research and theory about the process by which ethnicity affects children and the ways in which children come to understand their own and others' ethnicity. Contents include: Ethnicity and the young child; Minority status and the child; Later childhood and adolescence; The study of ethnicity.

**Piva, Michael (1988?). *The Condition of the Working Class in Toronto: 1900-1921*. Ottawa: University of Ottawa Press. (190 pp.; \$13.00)**

An examination of the standard of living of blue collar wage workers in Toronto, the author also discusses social and political reform movements during the same period.

**Reohr, Janet (1988). *Friendship: An Exploration of Structure and Process*. New York: Garland (200 pp.; \$27.00)**

Friendship is presented in the context of the mobile American society, and reciprocity in friendship is specifically outlined. A descriptive definition of adult American friendship is developed through a comparison to other relationships and a cross cultural view of friendship. The dynamics of the interaction between friends is discussed as well as the costs and rewards, prerequisite and maintenance conditions.

**Rueschemeyer, Dietrich (1988?). *Power and the Division of Labour*. Stanford, CA: Stanford University Press. (\$11.95)**

Criticizing the views of Durkheim, structural functionalists, and Marxists, the author questions explanations of the division of the division of labor based on efficiency. He argues that power must be a critical element of any adequate account. He tests the implications of his thesis in discussion of organizational authority, shopfloor division of labor, the professions, and changes in the structure of politics.

**Ruggles, Steven (1987). *Prolonged Connections: The Rise of the Extended Family in Nineteenth Century England and America*. Madison, WI: University of Wisconsin Press. (282 pp.)**

This study is based on census data from Erie County, New York and Lancashire, England, which document a dramatic increase in the number of persons living in extended households during the 19th century. Ruggles' purpose is to determine whether the changes were due to demographic changes or represented an adaptation to industrial dislocation. He presents a detailed examination of the effect of changing demographic patterns on the number of nonnuclear kin available for extended living arrangements.

**Salzinger, Suzanne, Antrobus, John, & Hammer, Muriel (Eds.). (1988). *Social Networks of Children, Adolescents, and College Students*. Hillsdale, NJ: Lawrence Erlbaum Associates. (315 pp.)**

This book addresses a series of questions about young people's social worlds. What is the nature of the child's social network -- how large is it, what is its composition and structure, how does it change over time? How do the characteristics of the child's social network affect social, cognitive, and emotional development? What are the key variables one must consider in approaching these questions? Studies included vary in methods, measures, and research focus; most are drawn from contemporary American society.

**Tardy, Charles H. (Ed.) (1987?). *A Handbook for the Study of Human Communication: Methods and Instruments for Observing, Measuring, and Assessing Communication Processes*. Norwood, NJ: Ablex Publishing Corporation. (403 pp.)**

Selected contents include: Communication networks/measurement techniques (P. Monge & R. Contractor); Dyadic personal relationships/measurement options (L.A. Baxter); Group communication research/use of interaction analysis (R.Y. Hirokawa); Group decision making/an approach to integrative research (D.S. Gouran); Interpersonal evaluations/measuring attraction and trust (C.H. Tardy); Interpersonal interaction coding systems (C.H. Tardy); Self-disclosure/objectives and methods of measurement (C.H. Tardy); Social support/conceptual clarification and measurement options (C.H. Tardy).

**Van Travis, Irene G. (1987?). *Networks: Communicating in the World Today*. Bryn Mawr, PA: Dorrance. (\$16.95)**

An approach to education, combining the academic, social and practical applications. Emphasizes the need for solid verbal foundations and developing positive attitudes toward teaching and learning.

**Waldinger, Roger D. (1986). *Through the Eye of the Needle: Immigrants and Enterprise in New York's Garment Trades*. New York: New York University Press. (231 pp.)**

Chinese and Dominican entrepreneurs in New York City's garment industry are the subject of this study. Seeking to refute explanations based on "immigrant culture", Waldinger provides a detailed examination of the economics of the garment industry, the 'vacancy chains' left by the exodus of Jewish and Italian entrepreneurs. Also examined is the role of ethnic networks in labor, production, and marketing.

## **Conferences**

**Papers from the Canadian Sociology and Anthropology Association. Windsor, Ontario. June 1988**

**Corman, June (Department of Sociology & Anthropology, Carleton University), *Employment and Household Constraints on Network Size*.**

The entry of increasing numbers of women into the labor force in recent years has sparked numerous debates over the effect of employment for their social and personal lives. This paper is an exploratory study of the relationship between network size and both employment status and participation in household labor. The sizes of women's networks are linked to their employment status and both their own and their husbands' participation in household labor. The size of the men's networks is linked to their wives' employment status and both their own and their wives' participation in domestic labor. The data show that employed women and their husbands have more ties than homemakers and their husbands.

**Hillock, David (Department of Social Work, University of Toronto), *Network Dimensions of Social Support*.**

The importance of studying social support is becoming clearer as the body of literature which examines the physical and mental health of those who are without it grows. While it is useful to study social support, doing so is often difficult because of the lack of established instruments. A review of the literature shows that the instruments used to measure social support vary tremendously and therefore, comparison and theory building are difficult. Manual Barrera's 'Arizona Social Support Interview Schedule' (ASSIS) addresses some of these concerns. The purpose of this paper is to present an enhanced version of the instrument referred to now as ASSIS-PLUS.

**Hirdes, John P. (Department of Sociology, University of Waterloo), *The Association between Social Isolation and Health Status in the Ontario Longitudinal Study of Aging*.**

Some previous research suggest an association between social networks and health status, although few Canadian longitudinal studies have dealt with this question. Data from the Ontario Longitudinal Study of Aging (LSA) may be used to examine the association between social relationships and health over time. The LSA is a 20-year longitudinal study which was initiated in 1959 by the Ontario Department of Public Welfare. A cohort of 2,000 45-year old males was interviewed annually until they were 65 in 1978. This paper examines the associations between social isolation, socioeconomic status, lifestyle variables, psychological well-being and health status at various points in the LSA.

**McGuire, Patrick (Department of Sociology, University of Toledo), *Social Networks and Industry Development: An Analysis of the Early Electric Utility Industry in the United States*.**

Attempting to specify Granovetter's theory of socially embedded economic relationships, I offer a historical analysis of a specific industry -- the electric utility industry. Examining the history of Chicago Edison and its leader Samuel Insull, it is argued that Insull used a series of informal and formal networks in and outside of the economic institution to minimize potential constrictions and maximize developmental opportunities.

**Scherer, Jacqueline (Oakland University, Rochester Hill, MI), *Trust and Social Networks***

Using data from a study of organizational and personal social networks in Pontiac, the theoretical ideas of Niklas Luhman on trust are applied to the messages that flow over network lines. I argue that trust is one of the most essential components of tight-knit networks and the reason why information is perceived to be more reliable when it comes from this source than from other sources, including written documentation. Understanding this phenomena explains why local community groups actually neglect a variety of informational sources with greater accuracy than oral conversation to make critical decisions.

**Tindall, David B. (Department of Sociology, University of Victoria), *Social Networks and the Commons Dilemma*.** Commons dilemmas occur when an individual is forced to choose between self-interest and societal interest with regard to the usage of a shared limited resource. The logic of the dilemma dictates that self-interest is rational for

the individual, but if pursued by all will eventually lead to lower payoffs for all, and threaten resource disaster. This paper examines data collected from an exploratory field survey study of commercial salmon trollers, which examined the effects of group membership on communication, resource perception, attitudes, and justice evaluations. The possibilities and implications of studying the commons dilemma problem from an explicitly social network analysis framework are discussed.

**Papers from the Conference on Corporate Interlocks, Nags Head Conference Center, Kill Devil Hills, North Carolina, September, 1987**

**Baker, Wayne E., The Consequences of Investment Bankers as Directors**

This study directly tests the validity of the critical and long-standing assumption in interlocking directorate research and theory that interlocked firms do business with each other. I focus on the interlocks between financial firms (investment banks) and nonfinancial corporations, involving a large and complete population. Economic ties are examined using direct, firm-level data on bank-corporation transactions for a variety of financial products: taxable debt and equity issued in the US, public Eurobonds, corporate-backed tax-exempt municipal issues, and mergers and acquisitions. Overall, I found that less than 50% of corporate boards give a lead share of business to their board-represented banks. Further, they use their interlocked banks for less often than expected by chance alone. Despite these general patterns, however, there is a great deal of variation among banks in the strength of the director economic overlay. The findings give partial support to the interorganizational perspective on interlocks, and add further empirical support to Granovetter's embeddedness argument.

**Bonacich, Phillip (University of California at Los Angeles), Simultaneous Group and Individual Centralities**

In describing the structure of interlocking directorates one may wish to identify central individuals as well as central firms. The simultaneous mapping of individuals as well as firms can contribute to the richness of the picture that emerges. One may know as much or more about some directors than about the firms they direct. A simultaneous mapping enables one to use both sets of information. Centrality involves, using Breiger's terms, the "duality" of groups and individuals. A central firm gets its central position from the board membership patterns of its members; they belong to the variety of boards that make the firm central; if its members belong to a constricted set of other boards, that firm is not central. Dually, a central individual should be one who belongs to a variety of important firms. One kind of centrality cannot be defined without reference to the other. The basic data for the study of interlocking directorates can be put in the form of a matrix  $A$  in which, say, the rows are people and the columns are boards.  $A_{ij} = 1$  if person  $i$  is a member of board  $j$  and  $A_{ij} = 0$  otherwise. The measure of board centrality (derived from the rows of  $A$ ) should be the same as the measure of individual centrality (derived from the columns of  $A$ ).

**Brewster-Stearns, Linda & Mark S. Mizruchi, What Do Corporations Do When They Need Money?: Social and Economic Determinants of Corporate Borrowing.**

This study examines the autonomy of nonfinancial corporations with respect to financial institutions. Researchers have assumed that the power of financial institutions is directly related to nonfinancial firms' use of external funds. Borrowing from financial institutions, however is merely one of several alternatives for raising capital. Moreover, corporations may not need the funds they borrow, but may simply be responding to favorable market conditions or investment opportunities. This paper addresses these issues by examining the determinants of corporate financing. Using time-series analysis, we examine the borrowing behavior of 22 large US industrial corporations from 1955 through 1984. The longitudinal design enables us to identify the effects of the general economic environment as well as firm-specific variables. Our results show that corporations' borrowing increases when their internal funds decrease, suggesting that need is a primary factor in corporations' borrowing decisions. In addition, although corporations often use alternative sources, only the acquisition of their own financial firm decreases their reliance on external financing. Finally, we find that the type of financial representative on corporations' boards of directors is more important than market conditions (e.g., interest rates and the phase of the business cycle) in predicting amount borrowed. This finding demonstrates that corporations establish intercorporate relations to facilitate resource exchanges. Hence, corporate decision-making about matters as fundamentally economic as borrowing is embedded in a structure of social relations.

**Clawson, Dan, Corporate Political Groupings: Behavior Versus Self-Reported Communication.**

A November 1986 survey of 94 corporate PACs political action committees (a random sample of 418 that contribute \$25,000 or more in 1984) had a response rate of 58% (=55 questionnaires). One question gave corporations a list of other businesses and asked them how frequently they interacted with each. This list included four



standard entries that remained uniform for each corporation, and 13 that were individually tailored to the particular PAC being surveyed, to include the 7 PACs whose behavior was most similar to their own, plus a random selection of other PACs. Responses to the question were disappointing: about 40% of the respondents indicated significant interaction with one or both of the two business peak associations listed (BIPAC and the Chamber of Commerce), but few indicated significant interaction with other corporations. This could be either because of a reluctance to provide accurate information, or because there is in fact little interaction. Separately, we have grouped corporations on the basis of the similarity in their political behavior in 1984 (1986 data are not yet available) using a variant of network methods. This paper compares the groupings based on behavior (in 1984) with the self-reports of communication (in 1986).

**Koenig, Thomas, Political Contributions from Interlockers: Both a Social and Economic Phenomenon**

In two recent papers Mizruchi and Koenig have studied the similarity of political action committee contributions from large American firms which are connected through interlocking directorates. In one study (1986) interlocks between firms in situations where one company has the economic leverage necessary to "constrain" the other, we found a negative correlation (-.109) between interlocks and contribution similarity. This relationship was even more strongly negative (-.158) when the interlock involved the officer of one of the corporations. The second paper (1985) examined contribution similarity between firms in the same industry. Since these firms cannot legally share directors, interlocks were defined as cases in which at least one director from each of the competing corporations met face-to-face on the board of a bank. In this situation there was a strong positive correlation (.451) between bank-mediated interlocks and contribution similarity. One problem involved in examining this anomaly is that interlocks may be a socially based act by an individual while a corporate contribution may have a more clearly economically rational act of a company committee. Thus, insight can be gained by looking at political contribution to the 1972 Presidential election. During this election there were few corporate PACs. Corporate officials frequently gave as individuals. Thus, we can look at the contributions of interlockers as individuals rather than assuming that they are representatives of the same people who make PAC decisions for the firm. We find that outside directors on the boards of the largest American banks are the most likely individuals to make large political contributions. Directors who are in exclusive clubs are more likely to contribute Republican than non-members. The more boards a director sits on the more likely he is to have contributed to the candidate of the corporate establishment, Richard Nixon. In short, there appears to be an inner circle of Republican contributors who are invited onto other boards -- particularly those of the largest banks -- while Democratic contributors were most likely to be isolated mavericks. When the firms were divided into cliques using SOCK and COMPLET, similar results were found. There were no Democratic cliques of noncontributors. Firms which were central to cliques were the most likely to have Republican inside and outside directors. They were also the most likely to have Democratic outsiders on their boards. There was no pattern to the clique location of Democratic insiders. Combined with the earlier findings, this suggests that the social factors stressed by the inner circle model; the importance of the largest banks as coordination centers as argued by the financial hegemony perspective; and the use of interlocks to defend the firm from those who have resources to constrain it as suggested by the resource dependency theorists, are all supported. Only those who argue that interlocks have little or no import need be troubled by these findings.

**Mintz, Beth, Director Networks: The Contribution of Organizational and Social Relationships to the Formation of Shared Boardships.**

This paper uses the network of relations among directors to explore the relationship between class position and institutional position in modern society. Modeling class as a series of relationships based on social attributes and modeling institutional position as a series of relationships based on organizational status, it measures the association between a matrix representing each definition of class or organization and a matrix of the formation of interorganizational ties. Taking seriously the concept that structure constrains and orchestrates social relations, the study uses Quadratic Assignment to measure the similarity between two matrices, incorporating information about the specific patterning of director ties. The results suggest that both organizational and class relationships are related to the formation of intercorporate ties, although the details differ in various parts of the system.

**Mizruchi, Mark S., Market Relations, Interlocks, and Corporate Political Behavior: Some Preliminary Results**

Political sociologists have debated for decades, without resolution, whether elites in advanced capitalist societies are integrated. Rather than asking whether elites are integrated, this study will examine the conditions under which convergence of political behavior occurs, focusing on campaign contributions of political action committees within the American business community. Units of analysis for the study are the 1770 dyadic relations between pairs of 57 major manufacturing corporations in 1980. The dependent variable is the extent to which two firms contributed to the same Congressional candidates in the 1980 elections. A model of similarity in corporate political behavior is

proposed that draws on principles developed by resource dependence and social class theorists of intercorporate relations. Variables hypothesized to affect convergence include involvement in the same industry or industries, the volume of transactions between industries in which the firms produce, the economic leverage, or "constraint," exerted by one firm over another, common stock ownership by financial institutions, interlocking directorates, and geographical proximity of headquarters and plant locations.

**Neustadtl, Alan, Interlocks and Corporate Campaign Contributions**

Analysis of corporate Political Action Committee contributions to candidates for Congress in the 1980 election indicates that the more director interlocks a corporation has, the more it supported moderates. Number of interlocks is one of the few variables that consistently predict corporate political behavior. The relationship remains after controlling for size of the corporation, multi-national orientation, capital intensity, regional location, industrial segment, and amount of defense contracts. The only other variables that consistently predicted corporate political behavior were presence in a regulated industry and the dollar volume of defense contracts. The impact of both those variables probably results from the fact that those corporations face high costs if they fail to support a powerful incumbent, since they are unusually vulnerable to government actions. Their preferences may be the same as those of other corporations, but they have less ability to act on their preferences. The impact of director interlocks needs to be further investigated. Highly interlocked corporations that supported moderates did so because they were supporting incumbents. They were not "corporate liberals" in that they did not target their money to races where the outcome was in doubt, while more conservative corporations did do so.

**Stokman, Frans N., Jelle van der Knoop & Frans Wasseur, Interlocks in the Netherlands: Stability and Careers in the Period 1960-1980**

The paper is oriented towards the dynamics behind the network of interlocking directorates. In the interorganizational perspective the stability of different types of interlocks/lines between corporations is of strategic importance; in the intraclass perspective the careers of persons. The paper therefore analyzes both. It shows that particularly primary interlocks (interlocks between corporation in which the multiple director has an inside position and the other corporations in which he has outside positions) as well as multiple interlocks between corporations are considerably more stable than other interlocks. They are most likely to have been used for interorganizational purposes. Most of the interlocks, however, are generated by a very specific career pattern in which an executive position in a large corporation is almost a prerequisite to obtain many directorships. The second part of the paper outlines a new international project, oriented towards processes within corporate boards. In this project teams from Germany, Great Britain, Japan, the Netherlands and New Zealand participate.

**Whitt, J. Allen, The Power of Connections: Corporate Networks and the Politics of Urban Growth**

Corporate interlock research has tended to focus mainly upon accounting for relations among firms. Consequently, the implications of the strongly metropolitan (or regional) base of interlock clusters has been treated as essentially epiphenomenal and uninteresting. This paper argues that the clustering of interlocks in cities is a potentially crucial research finding, one that promises to contribute both to increased understanding of urban areas and urban politics, and to a fuller appreciation of the implications of directorate interlocks. The relations of firms and clusters of firms to specific places is theoretically and practically important. It is argued that interlock researchers should be aware of, and should relate their work to, promising models of urban political economy, such as that provided by the "urban growth machine" concept.

**Ziegler, Rolf, Market, Power and Cooptation: A Structural- Individualistic Explanation of the German Intercorporate Network**

This paper performs a structural-individualistic analysis of the total network of common directorships among the 330 largest German corporations in 1981. In a multivariate model the specific effects of market structure, size, capital and credit allocation, type of ultimate ownership and codetermination on the probability of the occurrence of various types of interlocks are estimated and the goodness of fit to the observed set of interlocks evaluated. It also can be demonstrated that the predicted set of all dyadic relationships recovers some structural aspects of the whole network and the place of each individual company within the whole configuration.

## Journal Articles

**Browne, M.W. (1987).** The young-householder algorithm and the least squares multidimensional scaling of squared distances. *Journal of Classification*, 4, 175-190.

It is shown that replacement of the zero diagonal elements of the symmetric data matrix of approximate squared distances by certain other quantities in the Young-Householder algorithm will yield at least squares fit to squared distances instead of to scalar products. Iterative algorithms for obtaining these replacement diagonal elements are described and relationships with the ELEGANT algorithm (de Leeuw 1975; Takane 1977) are discussed. In "large residual" situations a penalty function approach, motivated by the ELEGANT algorithm, is adopted. Empirical comparisons of the algorithms are given.

**Bryant, Peter. (1988).** On characterizing optimization-based clustering methods. *Journal of Classification*, 5, 81-84. This paper suggests a simplification of a recent approach suggested by Windham to characterizing optimization-based clustering methods. The simplification is based on noting an analogy between certain quantities in Windham's formulation and corresponding quantities in mathematical statistics, particularly sufficient statistics and the exponential family of densities.

**Buchner, Bradley Jay. (1988).** Social control and the diffusion of modern telecommunications technologies: A cross-national study. *American Sociological Review*, 53, 446-453.

Published data routinely show a notable disparity in the relative growth of telephone and television technologies between Marxist and non-Marxist industrial nations, with Marxist nations favoring growth of television systems and non-Marxist nations generally favoring telephone systems. A study of 8 Marxist and 23 non-Marxist industrial nations was conducted using simple descriptive techniques and regression analysis. Results indicated that regime practices were a much stronger predictor than relative economic development.

**Burris, Val. (1987).** The political partisanship of American business: A study of corporate political action committees. *American Sociological Review*, 52, 732-744.

This study uses data on the contributions of corporate political action committees to evaluate six popular theories of business political partisanship. Two theories are supported by the data: the "Yankee-Cowboy" theory of regional political differences among U.S. corporations and the regulatory environment theory, which views the differential relationship to government regulation as a primary determinant of corporate political behavior. No support is found for four other theories of business political partisanship: the core-periphery theory, the inner-circle theory, the managerialist theory, and the domestic-multinational theory. The four disconfirmed theories are all variants of a perspective known as the theory of "corporate liberalism," which hypothesizes a tendency toward greater liberalism on the part of the more dominant or central corporations in American society.

**Burt, Ronald S. (1987).** A note on strangers, friends and happiness. *Social Networks*, 9, 311-331.

Using network data obtained in the 1985 General Social Survey, expressions of happiness are shown to increase with the size of a person's discussion network and decrease with the prevalence of strangers in the network. The density of especially close relations in the network has no direct effect on happiness. It is the negative impact of strangers rather than the positive impact of close relations that determines expressions of happiness. The network size and stranger effects remain strong even after respondent differences in socioeconomic status, age, sex, race, and domestic situation are held constant. However, it is clear that an almost certain route to strengthening the network measures to predict well-being lies in studying how happiness varies with the position of a spouse or other domestic partner in the respondent's network.

**Caldwell, Robert A. and Bloom, Bernard L. (1982).** Social support: Its structure and impact on marital disruption. *American Journal of Community Psychology*, 10, 647.

Availability of social support has been hypothesized to play a role in influencing adjustment to marital disruption either directly or by moderating the debilitating effects of stress. Yet previous research has not adequately conceptualized or measured the nature and availability of social support. In an effort to learn more about the structure and impact of social support as it relates to marital disruption, 50 newly separated men and women were interviewed at 2 months and again at 8 months after their separations. The structure of social support was found to include (a) several important sources of support, including family, friends and the larger community; (b) an index of social activity; and (c) a sense of satisfaction with present marital status. Although the stress associated with separa-

tion was positively related to poorer adjustment, certain aspects of social support were found to moderate this relationship.

**Caldwell, Robert A., Chin, Raymond J. and Pearson, Jane L. (1987). Stress-moderating effects: Social support in the context of gender and locus of control. *Personality and Social Psychology Bulletin*, 13(1), 5-17.**

Using multiple regression, the main and interactive effects of stress, social support, locus of control, and gender on psychological adjustment were investigated. In order to understand the complex interactions found, the adjustment effects of stress and social support were examined within four subgroups: internal and external men and women college students. Both social support and adjustment were assessed with multiple measures. Stress was more strongly related to levels of adjustment for women than for men. The relationships between social support and adjustment varied depending on which social support measure was used, which adjustment measure was used, as well as the locus of control orientation and gender of the subject. External men were the least able to use social support to aid adjustment. In contrast to previous investigations, there were no two-way stress x locus of control interactions. The importance of investigating the interactions of stress-moderating variables in specific subgroups is discussed.

**Campbell, Douglas F. (1988). A group, a network and the winning of church union in Canada: A case study in leadership. *Canadian Review of Sociology & Anthropology*, 25(1), 41-66.**

This paper, based on archival data, is a study of pro-change leadership in a social movement: namely, the ecumenical movement within the Canadian Protestant churches during the first quarter of this century which succeeded in merging several denominations into the United Church of Canada. First, the structure of the leadership is traced from a founding group to a dispersed and enlarged network, then the leadership is displayed in action at various levels of the church and society. Finally, the dissident activity of several of the original group members is investigated.

**Carroll, William K. (1987). Which women are more proletarianized? Gender, class and occupation in Canada. *Canadian Review of Sociology & Anthropology*, 24(4), 571-585.**

Using a special tabulation of 1981 Census data, this study assesses 1/ the extent to which gender differences in class reflect the occupational segregation of women into proletarianized positions and 2/ after controlling for the effects of occupational segregation, where in the occupational structure gender differences in class are most evident. Findings lend clear support to the claim that women are more proletarianized than men. Much of this tendency reflects women's exclusion from occupations in which ownership of the means of production is still an option. Controlling for this sexual division of labour, there remains a weak direct relation between gender and class, and dramatic gender differences in class within certain occupations. These results are discussed in terms of the historical conditions which have shaped the class positions of women and men in specific occupations.

**Doreian, P. (1987). A revised measure of standing of journals in stratified networks. *Scientometrics*, 11(1-2), 71-80.**

A modified index of journal standing in a stratified journal to journal citation network is proposed. The original index, generated through an application of input-output analysis, is used as the first step of an iterative procedure that converges on the new index. This index, an eigenvector of the inverted matrix used in the input-output analysis, has improved validity and better distributional properties than the original index.

**Doreian, Patrick. (1987). Measuring regular equivalence in symmetric structures. *Social Networks*, 9, 89-107.**

A method for computing the extent to which all pairs of points in a symmetric graph are regularly equivalent is proposed. By considering the relative centralities of points connected by an edge, the symmetric graph is decomposed into two asymmetric graphs. These asymmetric graphs provide the input for the regular equivalence algorithm, REGE, of White and Reitz (1983).

**Enmi, P. C. (1987). Structural determinants of occupational mobility in a regional labor market. *Environment and Planning A*, 19(7), 925-948.**

The purpose of this paper is to identify structural determinants of intraregional occupational mobility. This is done by developing a Markov chain model of job-vacancy transfers, disaggregating that model into its constituent parts, and identifying each part with a unique structural determinant. The disaggregated Markov model yields probabilities of mobility among occupational sectors for specific subgroups of mobile workers. To clarify ideas, a numerical illustration is developed. It is based on US census data and deals with occupational mobility among male and female members of the work force in the State of Utah.

**Fortin, Andree. (1987).** Les lieux de la sociabilite et de la solidarite feminines. Spaces of Sociability and Solidarity among Women. *Cahiers de Geographie du Quebec*, 31(83), 157-175.

Sociability among women is not equally distributed throughout the city. Depending on whether or not women live by themselves or with someone else, whether or not they have children, and where they were born, women live in, and feel different in, various location. Women's sociability and solidarity appear in particular spaces; geographical and affective proximity overlap and reinforce each other. In the downtown area, and particularly in housing coops. To find such social networks one often has to consider specific locations: streets or a block of houses. One often finds, either in the downtown or suburban areas, a circle of neighbours who exchange myriad services, and who become, over the years, friends. One could approach still closer the level of the home to see how this space, traditionally associated with women, is not a hidden sanctuary, but a space where all kinds of exchanges occur, and open to the community.

**Gartrell, C. David. (1987).** Network approaches to social evaluation. *Annual Review of Sociology*, 13, 49-66.

Social evaluation -- the way that people learn about themselves by comparing themselves with others -- is a prosaic, age-old process. Periodic efforts have been made to integrate theories and empirical studies of reference groups, social comparison, equity and justice, and relative deprivation (e.g. Pettigrew 1967). Despite these efforts, research has remained fragmented and continues to be dominated by psychologists. Network imagery, models, and findings run through this literature as far back as the last century and play a central role in contemporary applications of social evaluation to research on social support, class consciousness, and the diffusion of innovations. I argue that the network approach will help to resolve fundamental, unanswered questions about social evaluation first raised in 1950 by Merton and Rossi -- specifically, the origins of comparative frameworks and the relation between individual and categorical or group references points. Such an approach provides an integrative focus for sociological research in this area.

**Gottlieb, Benjamin & Coppard, Anne. (1987).** Using social Network therapy to create support systems for the chronically mentally disabled. *Canadian Journal of Community Mental Health*, 6(2), 117-131.

This paper describes a novel approach to the creation of a stable and responsive support system for the chronically mentally disabled living in the the community. It begins with an explanation of the clinical relevance of social network and support analysis, and then concentrates on the goals and the methods of assessment and intervention that have been pursued by a team of occupational therapists who have been conducting social network therapy in Toronto. Intervention goals are: to increase the network's size and particularly the size of the non-kin sector. To create at least two, but preferably more, distinct clusters in the networks while maintaining a moderate degree of linkage between the clusters. To minimize the encapsulation of a patient's network in someone else's network. To increase the symmetry or reciprocity of supportive exchanges between the patient and valued network members. To remove or insulate the patient from noxious or dependency-incurring social ties in the network. To reinforce existing supportive ties while increasing the range of supportive provisions exchanged therein.

**Gould, Roger V. (1987).** Measures of betweenness in non-symmetric networks. *Social Networks*, 9, 277-282.

Betweenness has commonly been regarded as a centrality measure that can only be employed with symmetric networks. This paper shows that computation of absolute partial betweenness scores is unproblematic for non-symmetric networks as well, as long as ordered pairs of points are considered. The maximum absolute score is also derived, making it possible to compute "relative" betweenness scores which can be compared across non-symmetric networks.

**Greenacre, Michael J. (1988).** Clustering the rows and columns of a contingency table. *Journal of Classification*, 5, 39-51.

A number of ways of investigating heterogeneity in a two-way contingency table are reviewed. In particular, we consider chi-square decompositions of the Pearson chi-square statistic with respect to the nodes of a hierarchical clustering of the rows and/or the columns of the table. A cut-off point which indicates "significant clustering" may be defined on the binary trees associated with the respective row and column cluster analyses. This approach provides a simple graphical procedure which is useful in interpreting a significant chi-square statistic of a contingency table.

**Helgeson, Vicki S., Shaver, Phillip & Dyer, Margaret. (1987).** Prototypes of intimacy and distance in same-sex and opposite-sex relationships. *Journal of Social and Personal Relationships*, 4, 195-233.

Differences between men's and women's conceptions of intimacy and distance may be a source of misunderstanding and conflict in close relationships. Although there is already an extensive literature on sex differences in in-

timacy, the meaning of the findings is somewhat unclear because each set of authors adopts a unique operational definition of intimacy. Often, this definition has been affected by the tendency to equate intimacy with self-disclosure. Distance (the opposite of intimacy, if intimacy is conceptualized as closeness) has been left largely unexplored in previous research and its relation to intimacy is unclear. In the present study, the components of intimacy and distance were delineated by asking men and women to describe an intimate and a distant experience with a member of the opposite sex and a member of the same sex. Prototypes were constructed by submitting the features mentioned in each kind of experience to hierarchical cluster analysis. The results revealed more similarities than differences between men's and women's conceptions of intimacy and distance. A conceptualization of intimacy emerged with a focus on appreciation and affection rather than self-disclosure. Distance appeared to revolve around dissatisfaction with and disapproval of the partner. Analyses of variance on specific features revealed sex differences and relationship differences that were consistent with previous research. Sex differences in the description of distance reflected the status or power differential between men and women.

**Ho, Edric, and Kochen, Manfred. (1987). Perceived acquaintanceship and interpersonal trust: The cases of Hong Kong and China. *Social Networks*, 9, 153-169.**

The relationship between a person's perception of others and how many acquaintances he thinks he has is analysed with data from a quota sample of 978 respondents in Hong Kong and 94 in China. Respondents in Hong Kong perceive one another as not trustworthy, selfish and unfair, much as in Japan, but this is not the case for China, nor for the U.S. It is competitiveness rather than culture that seems to account for this. People who do not trust one another tend not to perceive themselves as having many acquaintances.

**Homel, R., Burns, A., & Goodnow, J. (1987). Parental Social Networks and Child Development. *Journal of Social and Personal Relationships*, 4, 159-177.**

It has often been suggested -- but not demonstrated -- that parents' links with kin, neighbors, friends and formal organizations are likely to have many effects on children. In the present study independent interviews were held with 305 nine- to eleven-year-old children and their parents. Two aspects of parents' networks displayed strong effects: (a) the parental possession of regularly seen dependable friends ('friends you can call on in a crisis'), and (b) parents' affiliation with formal organizations. Both were associated with a range of effects. The parents' possession of dependable friends was related to the child's self-rated happiness, negative emotions, friendship network, school adjustment and social skills. Parents' formal group affiliations were related to the child's happiness, negative emotions, school adjustment and social skills. Over and beyond network variables, the socio-economic status of the neighborhood also displayed an effect, primarily on children's social involvement with peers and friendship patterns. The results point to some particular mechanisms that may underlie network effects: e.g. parents providing models of friendship patterns or access routes to the community.

**House, J., Umberson, D., & Landis, K. R. (1988). Structures and Processes of Social Support. *Annual Review of Sociology*, 14, 293-318.**

This chapter reviews the recent literature on social support and health and its relationship to pre-existing research and theory in the areas of social networks and social integration. We identify crucial directions for future theoretical and empirical work, focusing on the need to better understand the structures and processes through which social relationships affect human health and well-being. Two elements of social relationship structure are distinguished: (a) social integration, which refers to the existence or quantity of social relationships, and (b) social network structure, referring to the structural properties that characterize a set of relationships. We further identify three social processes through which these structures may have their effects: (i) social support, which pertains to the emotionally or instrumentally sustaining quality of social relationships; (ii) relational demands and conflict, referring to the negative or conflictful aspects of social relationships; and (iii) social regulation or control, referring to the controlling or regulating quality of social relationships. We also consider the social (as well as psychological and biological) determinants of levels and consequences of relationship structures and processes. In conclusion, we discuss the relevance of research and theory on social relationships and health to current demographic trends and public policy concerns.

**Israel, Barbara A., & Antonucci, Toni C. (1987). Social network characteristics and psychological well-being: A replication and extension. *Health Education Quarterly*, 14(4); 461-481.**

This article represents a replication and extension of a previous study by Israel and her colleagues that investigated the relationship between psychological well-being and social network characteristics. The present research included both a comparable sample of white women (N=104) between the ages of 60 and 68 (as in the original study), and a more extensive adult population of men and women (N=718) between the ages of 50 and 95. The

network characteristics examined are categorized along three broad dimensions: Structure-linkages in the overall network (size and density), interaction-nature of the linkages themselves (frequency, geographic dispersion, and reciprocity); and functions that networks provide (affective support and instrumental support). The results indicate a predominance of comparable findings for both the replication and extension studies. Of the eight network characteristics examined, the results of five of the regression analyses were the same across all three studies. The network characteristics of size, density, geographic dispersion, reciprocal instrumental support, and instrumental support did not make a significant contribution to the variance in psychological well-being. Of the other three network characteristics, the effect of frequency of interaction varied across the studies, and a pattern of significant results was found for affective support and reciprocal affective support. A discussion of this evidence in light of current literature and implications for practice and research is included.

**Jacobs, David. (1988). Corporate economic power and the state: a longitudinal assessment of two explanations. *American Journal of Sociology*, 93(4), 852-81.**

Much has been written about the relationship between the economic resources of corporations and their ability to control politics in advanced capitalist democracies. The resource that has received the most attention is economic concentration, but there is little agreement about the precise form of concentration that matters. In an attempt to find the most useful image of the state, this study looks at the connection between the aggregate concentration of assets among the leading manufacturing firms as well as the rate of business investment and taxes on business. Time-series regressions computed on U.S. national level data show that theories of the state that emphasize the independent activities of private investors are not supported. Instead, the aggregate concentration of assets, as measured by the share of assets held by the leading 100 firms, has a strong negative influence on effective corporate tax rates. These results are consistent with the theory that heightened aggregate concentration helps corporations organize to attain their political demands.

**Jobu, Robert M. (1988). Ethnic hegemony and the Japanese of California. *American Sociological Review*, 53, 353-367.**

This research proposes a model to explain how ethnic minorities establish an economic niche in the host society. The model emphasizes infrastructure and proposes the concept of ethnic hegemony a situation in which an ethnic group achieves economic control over an important economic arena that interfaces with the majority. By a priori specifying the model, it is possible to see how the ethnicity of a specific group might (or might not) reinforce the infrastructure. Japanese-Americans of California were used to assess the model empirically. Since the Japanese achieved remarkable upward mobility in the face of extreme discrimination, they constitute an important test of the model. Data drawn from various historical sources show that California Japanese hegemonized a specific arena of produce agriculture, from farm labor to production and through distribution. In a more limited way, they also hegemonized contract gardening. The model of ethnic hegemony was contrasted to the usual explanation for Japanese-American success-education. Distinctions between the model and the model of ethnic enclaves are discussed. In the future, the ethnic-hegemony model might be extended and specified to other ethnic minorities.

**Jung, John. (1987). Toward a social psychology of social support. *Basic and Applied Social Psychology*, 8(1 & 2), 57- 83.**

An analysis of social psychological aspects of social support examined several stages of the interaction between provider and recipient. In the first stage, the provider may offer support, respond positively to requests for support, or decline requests for support, whereas the recipient may seek, accept, or reject support. In the second stage, after support is exchanged, attributions about its effect may occur for each member, which in turn affects the extent to which the support is continued and the nature of its effect. Attributional errors about the effect may occur, especially if factors other than support-such as external factors-alter the problem status. The final stage follows the resolution of the problem and may involve reciprocation of support when roles are reversed, although such reciprocity may not be a necessary condition for social support. Possible mechanisms for both positive as well as negative effects of support were postulated. Assessing the effects of support is complicated by factors such as individual differences, the degree of match between social support beliefs held by provider and recipient, type of problem, and the timing of support.

**Klandermans, Bert & Oegema, Dirk. (1987). Potentials, networks motivations, and barriers: steps towards participation in social movements. *American Sociological Review*, 52, 519- 531.**

Four aspects of mobilization are distinguished: formation of mobilization potentials, formation and activation of recruitment networks, arousal of motivation to participate, and removal of barriers to participation. Four steps toward participation in social movements are then distinguished: becoming part of the mobilization potential, be-

coming target of mobilization attempts, becoming motivated to participate, and overcoming barriers to participation. The relevance of these distinctions is justified theoretically by the claim that different theories are needed to explain separate aspects of mobilization and participation, and practically with the argument that different efforts are required from movement organizations depending on which aspect they are handling. Empirical support from research on mobilization and participation in the Dutch peace movement is presented. Nonparticipation in a mass demonstration can be based on four grounds: lack of sympathy for the movement, not being the target of a mobilization attempt, not being motivated, and the presence of barriers. These results are interpreted in terms of the literature on mobilization and participation.

**Knoke, David. (1988). Incentives in collective action organizations. *American Sociological Review*, 53, 311-329.**  
The effects of members' interests in incentives offered by collective-action organizations are examined with data from a national sample of American associations. Members expressed interest in six distinct dimensions underlying organizational- incentive systems, and these different aspects are specifically related to different types of member involvement, controlling for other personal and organizational attributes. Members with higher interests in normative and social inducements offered by their organizations are more likely to contribute time, money, and psychological commitment and to engage in internal participatory actions. Lobbying incentives are strongly related to external participation. Overtly utilitarian incentives such as material benefits, occupational rewards, and informational incentives are either unrelated to involvement or actually attract members unwilling to participate. The implications of these results for Olson's "by-product" or selective-incentive explanation of collective action are discussed.

**Krackhardt, David. (1987). QAP partialling as a test of spuriousness. *Social Networks*, 9, 171-186.**  
A test of spuriousness for structural data is proposed. Partial correlations are calculated using OLS estimates. The test of significance is based on Hubert's QAP, a nonparametric permutation test. Results of Monte Carlo simulations indicate that statistical bias and efficiency characteristics of this procedure are very reasonable.

**Krackhardt, David. (1987). Cognitive social structures. *Social Networks*, 9, 109-134.**  
There are problems within the area of network analysis that can be fruitfully explored with cognitive social structures (CSS). Such structures can be modeled as three-dimensional ( $N \times N \times N$ ) network structures. A definition of such structures is presented, along with a review of some of the problems CSS might address. Three types of aggregations of CSS -- Slices, Locally Aggregated Structures (LAS), and Consensus Structures (CS) -- are proposed to reduce CSS to a tractable two dimensions for analysis. As an illustration, the CSS of a management team of a small manufacturing firm is analyzed comparing all three types of aggregations.

**Krohn, Marvin D. (1986). The web of conformity: A network approach to the explanation of delinquent behavior. *Social Problems*, 33(6).**

I use concepts and assumptions from the literature on social networks to construct a theory of delinquent behavior. The major premise of the theory is that the structural characteristics of a social (personal) network affect the degree to which participation in the network constrains behavior. I base hypotheses at both the social psychological and social structural levels of analysis on the structural characteristics of networks of multiplexity and density. Then I examine how this approach can account for some perplexing findings from past work on the relationships between social class and delinquent behavior. My essential argument is that social status and status area are related to delinquent behavior because they affect the structure of social networks.

**Lazerson, Mark H. (1988). Organizational growth of small firms: an outcome of markets and hierarchies? *American Sociological Review*, 53, 330-342.**

The success of small manufacturing firms is premised on their ability to develop alternative organizational strategies. This research, centered in Modena, a province of 600,00 located in the region of Emilia Romagna in north central Italy, demonstrates that when small companies expand through vertical and horizontal integration, they usually create other small firms that they control. This strategy preserves the advantages that Italian small firms enjoy in terms of state support, labor-market flexibility, and organizational efficiencies. Though this organizational form replaces market relations with bureaucratic relations, it bears little resemblance to the markets-versus-hierarchies theory of Oliver Williamson. Small firms integrate vertically and horizontally to insulate themselves from competition, not from the opportunistic practices of buyers and sellers. Indeed, greater reliance by small firms on bureaucratic relations is frequently compensated by their increased dependence on market relations through intensified subcontracting.



Lievrouw, Leah A., Rogers, Everett M., Lowe, Charles U., Nadel, Edward. (1987). Triangulation as a research strategy for identifying invisible colleges among biomedical scientists. *Social Networks*, 9, 217-248.

A triangulation strategy, employing a number of network analysis techniques, was implemented in the study of a single social network of biomedical scientists specializing in lipid metabolism research. Here we present the results of co-word analysis of grants awarded to these scientists by the National Institutes of Health, network analysis (NEGOPY) and factor analysis of the scientists' responses on a sociometric roster instrument, preliminary results of a co-citation analysis of their publications, and qualitative analysis of their responses to interviews and questionnaires. The findings are discussed in light of the relative information that the various techniques contribute to the understanding of the social relationships among the members of this scientific speciality.

Mackenzie, Suzanne. (1987). Neglected spaces in peripheral places: Homeworkers and the creation of a new economic centre. *Cahiers de Geographie du Quebec*, 31(83), 247-260.

This paper suggests that the current recession and restructuring may be creating new centres of economic and social innovation, the analytically and politically neglected homes and communities in the "peripheral" regions of Canada. Using data from the West Kootenay area of British Columbia, it is argued that people are responding to declining employment opportunities by utilizing the resources remaining to them in their homes and communities to develop new survival strategies. The paper focuses on home based businesses and cooperative networks in two fields -- childcare and craft manufacture -- which have been established primarily by women. These businesses and networks are assessed in terms of their mobilization of local resources and their impact on the economic and social life of the region. It is argued that, despite serious shortcomings, these may provide indications of new gender relations, based on family or household partnerships, and new economic relations, based on meeting local needs rather than the profitability requirements of corporations.

Markovsky, B., Patton, T., & Willer, D. (1988). Power relations in exchange networks. *American Sociological Review*, 53, 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 structures and that some networks contain overlapping but autonomous domains of power and exchange.

Marsden, P., & Hurlbert, J. (1987). Small networks and selectivity bias in the analysis of survey network data. *Social Networks*, 9, 333-349.

Selectivity bias is a danger whenever observations are systematically excluded from a set on the basis of a dependent variable, whether this exclusion is explicit or implicit. If present, the problem has severe consequences for the validity of statistical estimates of effects. The problem is of importance to the analysis of survey network data, since many network measures (such as density) are available only for persons having networks of size two or larger, while others (such as percent kin) are defined only for those having networks of size or more. Analysis can adjust for selectivity bias by estimating the risk of exclusion (in the case, of having a network of size 0 or 1), and including the modeled risk as a control in substantive equations. Such estimates are presented for the 1985 General Social Survey network data; in the course of this results of Fischer and Phillips on social isolation are replicated. Other ways of guarding against selection bias are also discussed; at a minimum, network size should be included among the set of regressors in analyses of survey network data, as a methodological control if not as a substantive variable.

Maryanski, A. P. (1987). African ape social structure: Is there strength in weak ties? *Social Networks*, 9, 191-215.

Prominent hypotheses on the structure of African ape social organization are examined from a network perspective. Data on chimpanzee and gorilla social ties are summarized and assessed with respect to the hypotheses. Contrary to most of the literature on African apes, a network analysis of social ties reveals that chimpanzees and gorillas have similar structural arrangements in their respective patterns of social organization. Granovetter's weak tie mode of integration of a population at the macro level is used to explain the data.

**Matthews, S. & Rosner, T. (1988).** Shared filial responsibility: The family as the primary caregiver. *Journal of Marriage and the Family*, 50, 185-195.

How adult siblings organize to meet the needs of their old parents is explored in this research. Fifty pairs of sisters who had at least one parent aged 75 or older responded in face-to-face interviews to questions about their parents' situation and the way they and their siblings divided filial responsibilities. Data were analyzed qualitatively. Once parents were perceived to have needs, sibling groups mobilized to meet them. Five styles of participation are identified, as well as three factors—family structure, family history, and extrafamilial ties—that affect which styles were included and who was likely to use a particular style in a sibling group mobilized to meet filial obligations.

**Matsueda, R. L. & Heimer, K. (1987).** Race, family structure, and delinquency: A test of differential association and social control theories. *American Sociological Review*, 52, 826-840.

Studies of the relationship between race and delinquency have typically found that broken homes lead to greater delinquency among blacks than whites, but have not demonstrated empirically why this is so. This paper derives theoretical mechanisms from differential association theory and social control theory, specifying how broken homes may influence delinquency among both blacks and nonblacks. The analysis specifies a structural equation model of delinquency (Matsueda 1982), derives competing hypotheses from the two theories, and estimates a cross-population model for blacks and nonblacks using data from the Richmond Youth Project. Consistent with previous research, we find that broken homes have a larger impact on delinquency among blacks than nonblacks, but, unlike previous studies, our model explains this effect completely. In both populations, the effects of broken homes and attachment to parents and peers are mediated by the learning of definitions of delinquency, a finding that supports differential association over social control theory.

**Morgan, D. L. (1987).** Rehabilitation: A technique to measure perceived social networks. *Social Networks*, 9, 135-152.

Coxon described a technique using card sorts to capture perceptions of the structure in social networks, but also expressed pessimism due to problems that limited its applicability. This paper addresses problems arising from "lumper-splitter differences" by first estimating their magnitude and then controlling for their effects. The magnitude of lumper-splitter differences is found to depend on the metric used to capture overlap in perceptions with the Pairbonds measure used by Coxon being especially susceptible. A control for lumper-splitter differences (based on randomly generated data) sharply reduces their influence.

**Mullins, Patrick. (1987).** Community and urban movements. *Sociological Review*, 35, 347-69.

Empirically and theoretically, this paper considers the link between the urban community, as a social base, and the emergence of urban movements. It examines whether different urban communities lead to different urban movements, specifically whether cohesive communities lead to powerful movements. Using an Australian case study, the first part of the paper tests this relationship empirically. The findings given raise doubts about whether cohesiveness is a necessary pre-condition for widespread mobilization, as well as questioning the theoretical validity of 'urban community' and 'community' as sociological concepts. There is an apparent need to discard these concepts when referring to contemporary Western societies and a concomitant need to develop concepts which more appropriately identify the social organization of urban households and residential areas. The second part of the paper discusses these theoretical issues. It presents an argument on the way household and residential organizations change as the city changes and how they differ if urbanization differs between regions and between nations. This argument provides a more appropriate framework for examining the nature of the relationship between social bases and urban movements and it contributes a more useful explanation for the case study.

**Nakagawa, Masanori and Chino, Naohito. (1988).** A dynamical model of social interaction. *The Japanese Journal of Psychonomic Science*, 6(1), 1-10.

The present study proposes a mathematical model for the dynamic change of social interaction between two persons. Even though social interaction has essentially a dynamic aspect which varies through time and across situations, the traditional psychology has never succeeded in treating this dynamic change. First, we assume some hypotheses on basic rules for the dynamic change of social interaction. Then, those hypotheses are integrated into a simple system of differential equations; a dynamical system. Each coefficient of terms in the system represents personalities of two person. In accordance with various combinations of values of the coefficients, social interaction between the two persons brings out a variety of dynamic phases which are represented in the phase space of the dynamical system. Furthermore, a concept of dynamic personalities, which vary according to situations, is

defined using a non-linear dynamical system. Finally, the relation between the present model and the method which constructs a dynamical system using an MDS, is discussed.

**Neustadtl, Alan and Clawson, Dan. (1988). Corporate political groupings: Does ideology unify business political behavior? *American Sociological Review*, 53, 172-190.**

Pluralists argue that corporations with different economic interests and market orientations are incapable of collective political strategy and actions, while class theorists argue that corporations have sufficient class interest to evolve a collective political class strategy. We examined this controversy using a variant of clique detection methods for business Political Action Committee (PAC) contributions to Congressional candidates in the 1980 election. One large group of corporations emerged based on shared conservative beliefs. No other groups nearly as large were detected. The findings were strong and robust for different levels of political similarity. The identified groups differed from each other economically in various ways, but these differences were not nearly as marked as the political differences. Overall, the evidence lends stronger support to the class rather than the pluralist perspective.

**Oliveri, Mary Ellen and Reiss, David. (1987). Social Networks of family members: Distinctive roles of mothers and fathers. *Sex Roles*, 17, 719.**

The personal social networks of fathers, mothers, and adolescent children in a sample of intact family triads were examined in order to explore the effect of sex role on parent-adolescent continuities in social orientations. Comparison of father-adolescent and mother-adolescent associations in characteristics of personal networks revealed, overall, that adolescents were more consonant with mothers than with fathers, particularly in the area of kinship relations. Fathers' distinctive associations with adolescents were in the area of friendship relations and concerned affective aspects of relationships. These patterns of association were not dependent on gender of adolescent. Findings are interpreted in terms of the documented role of mothers as "kinkeepers" in family affairs and in terms of emerging work suggesting the salience of interaction with fathers for children's development of sensitivity to affective cues.

**Palisi, Bartolomeo J. and Ransford, H. Edward. (1987). Friendship as a voluntary relationship: Evidence from national surveys. *Journal of Social and Personal Relationships*, 4, 243-259.**

This paper focuses on voluntary friendships. Drawing from Fischer's (1975) subcultural theory of urbanism, it is hypothesized that voluntary interaction with friends will be characteristic of individuals who live in urban areas. Friendship is also expected to be characteristic of high-urban areas. Friendship is also expected to be characteristic of high-SES, young, unmarried and childless individuals. An underlying rationale is that friendship occurs when individuals are relatively free from obligatory ties, duties and other constraints on their free choices. NORC data from 1974-83 are used to test the hypotheses. In the analysis, a distinction is made between involvement with friends outside the neighbourhood and social involvement with neighbours. The findings indicate that income, age, marital status and number of children significantly influence voluntary friendships. In addition, interaction analyses (product term) suggest that combinations of the independent variables produce the greatest effect on friendship.

**Portes, Alejandro and Sassen-Koob, Saskia. (1987). Making it underground: Comparative material on the informal sector in western market economies. *American Journal of Sociology*, 93(1), 30-61.**

This paper examines the informal economy and its relationship to commonly held theories of industrial development. Although these theories stem from very different intellectual traditions, their general assumption has been that widespread informal economic activities are primarily a feature of Third World economies, in which they function as a refuge from destitution; such activities are presumably destined to disappear with the advance of modern, industry-led growth. Evidence is presented that indicates that these assumptions, including the identification of informality with conditions in the less developed countries, are wrong. Alternative interpretations of the resilience of these activities in Third World countries, despite rapid industrialization, and their continuity and apparent revival in the advanced economies are discussed.

**Richardson, Laurel. (1988). Secrecy and status: The social construction of forbidden relationships. *American Sociological Review*, 53, 209-219.**

This paper discussed how status and secrecy affect the social construction of secret, forbidden, intimate relationships. Based on an analysis of 65 intensive interviews with single women involved with married men, two stages of intimacy emerge: (1) exchanging secrets about the self or "Becoming Confidantes" and (2) creating mutual secrets

or "Becoming a We". The man's marital status, reinforced by his gender and socioeconomic status, has major effects concerning time constraints, expectations of temporariness, and privacy. These lead to intense feelings, idealization, and trust, which enhance the woman's commitment to perpetuating the relationship. The relationship is perpetuated through the construction of mutual secrets (rituals and property), which are imbued with intense symbolic significance. The strategies used to conceal the relationship increase the woman's dependence on it and reduce her power within it. Secrecy protects the interests of the powerful.

**Richardson, R. Jack. (1987). Directorship interlocks and corporate profitability. *Administrative Science Quarterly*, 32, 367-386.**

This paper contributes to recent progress in conceptual clarifications that differentiate between two types of inter-organizational directorship interlocks—those that appear to perform interorganizational functions and those apparently fulfilling integrative functions that transcend narrow corporate interests. It then develops, from a synthesis of the interorganizational theories, a set of testable hypotheses concerning the relationship between specific types of directorship interlocks and corporate profitability. An empirical analysis of the top 200 corporations in the postwar Canadian economy shows that accidentally broken interlocks that have been replaced by a new interlock in the same direction between the same pair of firms—and only these interlocks—are strongly related to corporate profitability. The findings also refute the propositions of financial control and co-optation theorists that directorship interlocks affect corporate profitability by demonstrating the reverse causal direction—that this specific type of interlock is found as a result of the profitability of the corporations involved.

**Richardson, R. Jack. (1988). A sacred trust: The trust industry and Canadian economic structure. *Canadian Review of Sociology & Anthropology*, 25(1), 1-22.**

Within the realm of financial institutions, the Canadian trust industry has recently developed into a set of institutions that now challenges the domestic hegemony of the banks. At the same time, this industry has become integrated into several of the dominant Canadian conglomerates, thus blurring the traditional division between financial and non-financial institutions. This paper begins by analyzing the recent transformation in the structure of the Canadian trust industry. It then integrates this into an analysis of similar structural transformations within the Canadian economy at large. It concludes by suggesting the social significance of these processes.

**Rogers, Everett M. (1987). Progress, problems and prospects for network research: Investigating relationships in the age of electronic communication technologies. *Social Networks*, 9, 285-310.**

Here we look at the past accomplishments, present difficulties, and future potentials of network research, stressing the unique advantages of investigating the new interactive technologies. A positive assessment of the past scientific accomplishments of network research is tempered by serious epistemological problems: inadequate attention to network theory, network sampling problems that restrict the generalizability of results, and underemphasis upon data-gathering and measurement, and an analytical shortchanging of the message content that flows through links over time. Partial solutions to certain of these difficulties may be found in network research on the new interactive communication systems.

**Rosenthal, Carolyn. (1987). The comforter: Providing personal advice and emotional support to generations in the family. *Canadian Journal on Aging*, 6, 228-39.**

This paper presents a novel conceptualization of emotional support in intergenerational families. In a stratified random sample of 458 adults in Hamilton, Ontario, over half the respondents said that there was currently, or had been in the past, a person in their family to whom other family members turned for emotional support and personal advice. In the paper, this person is referred to as the "comforter." Many people also identified the person who provided emotional support prior to the present comforter. On the basis of the data, a "position" of family comforter is inferred. The paper investigates the social correlates of the position, the type of activities associated with being the family comforter, and the pattern of succession as different generations in the family move in and out of the position. The paper demonstrates the family provision of emotional support at the level of the extended family. It is shown that occupancy, activities and succession of the comforter position are patterned by gender. Further, the data suggest that people seek emotional support from a generational peer.

**Roy, William G. and Bonacich, Phillip. (1988). Interlocking directorates and communities of interest among American railroad companies, 1905. *American Sociological Review*, 53, 368-379.**

The debate about the separation of ownership and control has focused primarily on internal control of corporations. This study examines the relationship between ownership and control at the interorganizational level. It investigates the relationship between the structure of interorganizational title, as indicated by proprietary communities

of interest, and the structure of interorganizational control, as shown by clusters of firms that recruited their boards from the same sets of directors. Secondly the paper investigates the structure of centrality in the interlocking directorates, for which managerial theory predicts a close relationship between size and centrality. Examining American railroads in 1905, the results show that (1) while ownership and control may or may not have been separate at the level of the individual firm, at the interorganizational level the structure of title conforms very closely to the structure of control; and (2) the structure of centrality exhibits no singular hierarchy, but distinct clusters. Moreover, major companies were not highly central in the entire network, but were instead dominant within particular clusters, suggesting that centralization does not always engender power. The paper concludes that the debate over ownership and control should focus on both organizational and interorganizational levels.

**Rytina, Steven, Blau, Peter M., Blum, Terry, and Schwartz, Joseph. (1988). Inequality and intermarriage: A paradox of motive and constraint. *Social Forces*, 66(3), 645-675.**

The widely varied meanings of the term "social structure" rob it of usefulness. Following Durkheim, social structure should refer to extra-individual, positively ascertainable social facts that exert constraint on individuals. We examine the pact of inequality on association, specifically on marriage within and among social strata. The constraint that inequality exerts on intermarriage is less obvious than the notion that inequality increases the motive for status homogamy. A mathematical model, derived in the Appendix, indicates, however, that inequality constrains people to marry unequals. Data for 125 SMSAs for intermarriage with respect to education, socioeconomic index, and income show that the model works well for education and socioeconomic index. The paradox of structure and constraint is that greater structural inequality is imported into the pair relations among population members in the face of empirically evident aversion to relations bridging status distance. Inequality is antagonistic to homogamy.

**Sanders, Jimmy M. & Nee, Victor. (1987). Limits of ethnic solidarity in the enclave economy. *American Sociological Review*, 52, 745-773.**

Contemporary research on the social and economic adaptation of immigrants to life in the United States emphasizes the salience of ethnic solidarity. Portes and others advance the "enclave-economy hypothesis" that immigrants in an enclave-labor market receive earning-returns to human capital commensurate with the earning-returns of immigrants in the primary labor market. This position contradicts the classical assimilation view that segregation retards the economic achievement of minorities. However, our analysis of earnings among Cuban and Chinese immigrants suggests that the enclave-economy hypothesis is only partially correct. The hypothesis is supported in the case of entrepreneurs, but the assimilation perspective better explains the earnings of employees. We suggest a reformulation of the enclave-economy hypothesis that is sensitive to important differences between immigrant-workers and immigrant-bosses.

**Sarason, Irwin G., Sarason, Barbara R., Shearin, Edward N., & Pierce, Gregory R. (1987). A brief measure of social support: Practical and theoretical implications. *Journal of Social and Personal Relationships*, 4, 497-510.**

Two studies leading to the development of a short form of the Social Support Questionnaire (SSQ) are reported. In Study 1 three items selected for high correlations with the total score (SSQ3) were administered to 182 university students together with several personality measures. SSQ3 had acceptable test-retest reliability and correlations with personality variables similar to those of the SSQ. Internal reliability was marginal although acceptable for an instrument with so few items. Study 2 employed three sets of data in developing a six-item instrument (SSQ6). The SSQ6 had high internal reliability and correlated highly with the SSQ and similarly to it with personality variables. The research findings accompanying the development of the short form social support measure suggest that perceived social support in adults may be a reflection of early attachment experience.

**Schott, Thomas. (1987). Interpersonal influence in science: Mathematicians in Denmark and Israel. *Social Networks*, 9, 351-374.**

Influence by one person upon another is conceptualized as a combination of one's influentiality as influence upon other generally; the other's susceptibility to receive influence from others generally; and the particular influence by one upon the other. These three components can be estimated by a loglinear model, give a network of influence. Among the Danish and among the Israeli mathematicians, particular influence is most salient, influentiality second, and susceptibility least salient. Interpersonal influence can be explained by accounting for each component. A mathematician's susceptibility is promoted by access to colleagues but decreases with age, a scientist's influentiality is favored by expertise and experience and also by access to colleagues but decreases with age and particular influence between researchers depends on educational and collegial ties between them, especially collegialship in specialization, but hardly on status ties.

**Scott, John & Leicester, Soe. (1988). Trend report social network analysis. *Sociology*, 22(1), 109-127.**

This paper reports on the development of social network analysis, tracing its origins in classical sociology and its more recent formulation in social scientific and mathematical work. It is argued that the concept of social network provides a powerful model for social structure, and that a number of important formal methods of social network analysis can be discerned. Social network analysis has been used in studies of kinship structure, social mobility, science citations, contacts among members of deviant groups, corporate power, international trade exploitation, class structure, and many other areas. A review of the formal models proposed in graph theory, multidimensional scaling, and algebraic topology is followed by extended illustrations of social network analysis in the study of community structure and interlocking directorships.

**Shapiro, Susan P. (1987). The social control of impersonal trust. *American Journal of Sociology*, 93(3), 623-58.**

How do societies control trust relationships that are not embedded in structures of personal relations? This paper discusses the guardians of impersonal trust and discovers that, in the quest for agent fidelity, they create new problems. The resulting collection of procedural norms, structural constraints, entry restrictions, policing mechanisms, social-control specialists, and insurance-like arrangements increases the opportunities for abuse while it encourages less acceptable trustee performance. Moreover, this system sometimes leads people to throw good "money" after bad; they protect trust and respond to its failures by conferring even more trust. The paper explores the sources and consequences of the paradox that the guardians of trust are themselves trustees.

**Shrum, Wesley & Wuthnow, Robert. (1988). Reputational status of organizations in technical systems. *American Journal of Sociology*, 93(4), 882-912.**

An important, but relatively neglected, aspect of social stratification in modern societies is the reputational status associated with complex organizations in interdependent organizational fields. In this study, social factors influencing the reputational status of research organizations in large-scale, cognitively diverse, multisectoral "technical systems" are examined. Data are drawn from interviews with personnel from a national U.S. sample of 50 organizations engaged in research on nuclear-waste management and 47 organizations involved in photovoltaics research. The reputational status of each organization was assessed by knowledgeable respondents from other organizations in each system. A model is presented that characterizes reputational status as a function of organizational performance, organizational structure, and network position. Support is obtained for the model by the use of both subjective and objective indicators, including evidence of the mediating effects of network position. Further results obtained from a blockmodel analysis indicate that ties to specific blocks are a more important determinant of reputational status than block membership.

**Silverman, Marilyn. (1987). Agrarian processes within 'plantation economies': Cases from Guyana and coastal Ecuador. *Review of Canadian Sociology & Anthropology/Canadian Review of Sociology & Anthropology*, 24(4), 550-70.**

'Plantation economy,' as a dependency model for analyzing West Indian society, has theoretical and practical problems when applied to actual agrarian situations. These problems stem from a 'plantation-peasant' dichotomy and from the assumption that these are homogeneous, empirical structures. In contrast, ethnographic studies have pointed out the complexity of contemporary agrarian forms. However, a continuing effort to refine these types has, in turn, obscured the variable processes of economic differentiation within local agrarian systems in which production has been, and is, for export. In order to contribute to a more general understanding of these processes, this article provides two case studies of local agrarian change within plantation economies and tries to isolate those factors which contributed to the observed variations in these agrarian histories.

**Soete, Geert De, Carroll, J. Douglas, DeSarbo, Wayne S. (1987). Least squares algorithms for constructing constrained ultrametric and additive tree representations of symmetric proximity data. *Journal of Classification*, 4, 155-173.**

A mathematical programming algorithm is developed for fitting ultrametric or additive trees to proximity data where external constraints are imposed on the topology of the tree. The two procedures minimize a least squares loss function. The method is illustrated on both synthetic and real data. A constrained ultrametric tree analysis was performed on similarities between 32 subjects based on preferences for ten odors, while a constrained additive tree analysis was carried out on some proximity data between kinship terms. Finally, some extensions of the methodology to other tree fitting procedures are mentioned.

**Stolte, John F. (1987). The formation of justice norms. *American Sociological Review*, 52, 774-784.**

Joining ideas from structural exchange theory and symbolic interaction theory, this paper addresses two questions: (a) How does a justice norm form? and (b) Why do variations among justice norms arise? Exchange theory clarifies the objective, structural, and largely "material" contexts in which justice norms originate. Symbolic interaction theory illuminates the subjective, intersubjective, and mainly "ideal" process through which justice norms emerge. Context variations in structural exchange (whether a setting entails distributive or productive exchange, equal or unequal power-dependence) help account for the formation of specific justice norms: equal opportunity, equality, status-rank inequality, need, and equity. We link our theoretical account to existing data and suggest experimental tests of its key implications.

**Suitor, J. Jill. (1987). Friendship networks in transitions: Married mothers return to school. *Journal of Social and Personal Relationships*, 4, 445-461.**

The present study uses a combination of qualitative and quantitative data on forty-four married mothers and 231 of their non-familial associates to investigate changes in the mothers' friendship networks during their first year of enrollment in a university. Drawing upon theories of status similarity and reference groups, it was anticipated that the women's friendship networks would be affected both by changes in status similarity to their associates, and by the women's degree of involvement in the new focus of activity. It was found that (1) the women and their husbands reported that well-educated friends held predominantly positive attitudes towards the enrollment, while less educated friends held predominantly negative attitudes towards it; and (2) full-time students' closeness and frequency of interaction with less educated friends declined notably over the year, while a similar pattern did not emerge among part-time students. Explanations for these patterns are discussed.

**Todd, David M. (1987). Microcomputer-assisted qualitative analysis: A research tool for scientist-practitioners. *Professional Psychology: Research and Practice*, 18(5), 520- 525.**

The potential role of microcomputers in qualitative research in psychology has yet to be explored. Such applications might be of particular value at this time, given recent discussions of the role that more case-intensive methodologies might play in improving the integration of clinical practice and scientific research. In this article I present a rationale for exploring the use of microcomputer-assisted qualitative analysis in psychology, and I describe an approach and a technology for such analysis that is widely accessible to individual scientist-practitioners, regardless of the settings in which they work.

**Windham, Michael P. (1987). Parameter modification for clustering criteria. *Journal of Classification*, 4, 191-214.**

The more ways there are of understanding a clustering technique, the more effectively the results can be analyzed and used. I will give a general procedure, called parameter modification, to obtain from a clustering criterion a variety of equivalent forms of the criterion. These alternative forms reveal aspects of the technique that are not necessarily apparent in the original formulation. This procedure is successful in improving the understanding of a significant number of clustering techniques. The insight obtained will be illustrated by applying parameter modification to partitioning, mixture and fuzzy clustering methods, resulting in a unified approach to the study of these methods and a general algorithm for optimizing them.

**Wright, Erik Olin and Martin, Bill. (1987). The transformation of the American class structure, 1960-1980. *American Journal of Sociology*. 93(1), 1-29.**

This study explores a series of predictions concerning the likely changes in the American class structure in the 1970s made by Wright and Singelmann in their work on proletarianization. They argued that, in a period of economic stagnation such as occurred in the 1970s, there should be an acceleration of the process of proletarianization and a decline in the expansion of managerial and semiautonomous employee (or expert) locations in the class structure. These changes should occur both because of an intensification of proletarianization within economic sectors and because of an intensification of proletarianization within economic sectors and because of decline in the shift of employment into the relatively less proletarianized sectors such as the state. On the basis of the data used in this study, one of these predictions is supported. Indeed, the evidence indicates a decisive acceleration of the growth of managerial class locations in the 1970s and a clear deproletarianization within and across economic sectors. These findings are interpreted as a result of two principal factors: the internationalization of American class relations during the 1970s and the effect of technological and organizational changes in production on classes in the United States.

**Wright, Paul H. (1988).** Interpreting research on gender differences in friendship: A case for moderation and a plea for caution. *Journal of Personal and Social Relationships*, 5, 1- 29.

Research on gender and friendship has yielded a modal pattern of differences between women and men that is impressively robust. However, these differences are reported in ways that are sometimes misleading and often exaggerated, and that generally leave the impression of greater within-gender uniformity than is actually the case. In sum, the importance of gender differences in friendship is overemphasized. The present paper addresses some possible meanings of 'importance' as applied to social research. It is intended to be a reminder of some widely acknowledged but easily overlooked points of interpretation concerning the kinds of data with which relationship researchers usually deal. Specific issues are the tendency to reify statistical significance, to overlook within-group variability, and to disregard the implications of gender as a subject variable. Moderation in interpreting and reporting differences and healthy skepticism are offered as simple hedges against exaggerating the importance of gender differences in friendship.

**Wuthnow, Robert. (1988).** Exploring the social sources of denominationalism: Schisms in American Protestant denominations, 1890-1980. *American Sociological Review*, 53, 343-352.

Schisms are a major source of new religious denominations in America, but have received little attention in the sociological literature. This study is critical of the conventional assumption that schisms arise primarily from internal doctrinal disputes. Drawing on the resource mobilization literature, we offer an alternative argument that vulnerability to schism is related to the organizational characteristics of denominations. We apply dynamic quantitative techniques to longitudinal data on Protestant denominations in the U.S. to test hypotheses about denominational centralization, linkages to the wider environment, and demographic characteristics. Findings suggest that the larger the denomination, the greater the tendency to schism; the size effect is inhibited, however, when denominations are linked to interorganizational federations.

**Yamagishi, Toshio, Gillmore, Mary R. and Cook, Karen S. (1988).** Network connections and the distribution of power in exchange networks. *American Journal of Sociology*, 93(4), 833-51.

This article presents an extension of recent work on exchange networks and specifies theoretically the implications of different types of network connections for the distribution of power. The paper employs power-dependence principles to make predictions concerning the distribution of power in differently organized exchange networks. The results of several laboratory experiments are reported testing these predictions. Computer simulation results are also presented testing predictions that extend beyond the experimental work. The findings demonstrate that the locus of power in exchange networks is determined by the nature of the network connections (positive, negative, or mixed) and the scarcity of resources, factors that alter the underlying dependency relations.



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