Toward a Resolution of Methodological Dilemmas in Network Mapping

by Jay Sokolovsky and Carl I. Cohen

Abstract

In mapping social networks, investigators have confronted the following choices in the selection of an instrument to assess networks: (1) qualitative versus quantitative approaches; (2) subjective versus objective criteria; (3) synchronic versus diachronic descriptions. Evolving out of fieldwork with discharged mental patients, the Network Analysis Profile was designed to resolve these methodological dilemmas. Although it has not been completely successful in meeting this goal, the Network Analysis Profile offers distinct advantages over other instruments. A description and an illustration of its use are provided.

Over the past decade, a growing number of investigators have begun to examine systematically the interrelationships of mental illness and "social networks" (Pattison 1977; Cohen and Sokolovsky 1978; Hammer, Makiesky-Barrow, and Gutwirth 1978; Sokolovsky et al. 1978; Cohen and Sokolovsky 1979). Despite recognition of the possible importance of social relations in shaping the onset, reaction to, and management of psychotic states, too little attention has been paid to the type of data produced by various network analysis strategies. In the convergence of psychology, sociology, and anthropology in this area of research, several major goals have emerged: (1) accurately delineating quantitative network features (e.g., network size, frequency of contact) for a meaningful sample; (2) assessing the qualitative nature and cultural meaning of transactions; (3) establishing the morphological/structural organization of the network as a holistic entity or system; (4) understanding the process of flux and transformation of the above features of networks. Depending upon the particular objectives of the researcher, there has been a tendency to develop instruments for mapping social networks that emphasize one or two of these goals at the expense of the others. Thus, investigators have had to select existing network instruments that obscure various facets of social interaction or develop new special purpose instruments of their own. Because of the diverse instruments used, it has been difficult to compare network studies.

Investigators have confronted the following basic choices in the selection of a network instrument: (1) qualitative versus quantitative approaches; (2) subjective versus objective criteria; (3) synchronic versus diachronic descriptions. Below, we briefly review the methodological issues surrounding the selection of network instruments, and then describe the Network Analysis Profile, an instrument designed to resolve many of the methodological dilemmas.

Methodological Issues

Qualitative vs. Quantitative Approaches. In anthropology, network analysis developed through the work of Barnes (1954), Bott (1971), and other European an-

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thropologists (Epstein 1961; Mitchell 1969; Boissevain 1978) who were doing research on urban communities. These theorists attempted to go beyond an abstract notion of social structure by analyzing the dynamics and meaning of social exchange. The importance of such an approach, Fisher et al. (1977, p. 28) note, is that it bridges "the gap between individual and aggregate models of social life" and, at the same time, "incorporates the purposeful actions of individuals into models of socio-structural process."

In pursuing this strategy, anthropologists have emphasized long-term fieldwork and participant observation in community settings. The goal has been not only to define the behavioral qualities of social linkages, but also to understand their symbolic meaning at a cultural level. Unfortunately, the methodology involved in these observational studies has seldom been clearly specified, and there are therefore problems in comparability between studies. Often investigators have either concentrated on assessing total networks in very small samples or on collecting good qualitative data on larger sets of partial networks. Indeed, a general problem presented by traditional anthropological approaches is that rigorous observation of behavior for all network members, over any substantial time, severely tests the capabilities of research techniques.

Sociological approaches, on the other hand, have tended to be focused on developing formal questionnaire techniques that can be used for sampling large populations and that presumably have a good measure of comparability. We have called the eliciting techniques that are most often used and associated with mass survey research "enumerative sociometric" methods (Sokolovsky and Cohen, in press). These methods may involve limited choice questions such as, "Who are your three best friends?" and "Who are the three relatives you see most often?" They may also involve enumerative questions such as, "How many relatives did you see last week?" and "How many good friends do you have?" Research based on enumerative sociometric methods has rarely been carried out in conjunction with ethnographic field techniques that could demonstrate the behavioral veracity of responses, as well as provide a basis for asking meaningful questions within given societal contexts.

To cite an example, in studies that have used friendship indices, it has been found that having or claiming to have "friends" is equated with a high degree of sociability, and conversely, an absence of "friends" is equated with isolation. Lowenthal and Robinson (1976), who used the approach to study the link between social isolation and mental illness in the aged, have pointed out that friendship studies are complicated by the wide differences that exist in percepts of friendship networks and definitions of friends by sex, socioeconomic status, and geographic location. Our study of 161 aged urban hotel dwellers supports Lowenthal and Robinson's contention: one-half of individuals described as "not a friend" were engaged in the exchange or provision of sustenance items with the respondent, two-fifths were engaged in multiple transactions, one-eighth were rated "important," and a few (5 percent) were considered intimates. Conversely, nearly one-fourth of those labeled as "friends" were judged to be "not important" (Cohen, Cook, and Rajkowski 1980).

Although enumerative sociometrics can be used to generate large samples (in the thousands), such methods can seriously compromise the distinction between real and ideal behavior. Killworth (1974) and Killworth and Bernard (1976) have criticized such instruments for yielding rather weak correlations between questionnaire responses and actual communication, for focusing on isolates rather than recording possibly important but weak human ties, and for largely ignoring the importance of inequalities in relationships (e.g., class, power, lack of reciprocity).

Subjective vs. Objective Criteria. Much previous work has been vitiated by the failure of instruments to elicit both objective and subjective network data, and to do this at various levels of interaction. Many investigators have used the respondent's ratings of the "importance" or "closeness" of an individual as the sole criterion for inclusion within the network (Craven and Wellman 1973; Brim 1974; Pattison 1977; Tolsdorf 1978). A potential problem with this approach is that respondents' perceptions of importance may not correspond to the objective importance of particular persons as measured by exchanges of key goods or services. This is not to say that subjective aspects of networks are not important, but rather that good network instruments should be able to delineate both objective and subjective elements accurately.

Early in our investigations of schizophrenics living in a mid-Manhattan hotel, we recognized that many persons (schizophrenics and nonschizophrenics) greatly underestimated the number and intensity of their social relationships in their responses to questions like, "Who are your friends?" and "Who are the people most important to you?" Other respondents reversed the pattern, declaring that virtually everyone was their friend or was important to them. A network list based on the subjective criteria of friendship or importance rather than specific behaviors seemed to have missed much significant data when it was matched against our observations of interaction in the hotel. In our later study of elderly hotel residents, we found the 41 percent of those network members *not* considered subjectively "important" by respondents were exchanging or providing sustenance items to them (Cohen, Cook, and Rajkowski 1980). Such findings have convinced us that in order to make an accurate assessment of the total personal networks of schizophrenics (or others), it is necessary to establish behavioral boundaries for networks and then to proceed to qualitative and subjective components of social exchange.

Synchronic vs. Diachronic Descriptions. Anthropologists have frequently employed some type of "log" or "network serial" method that concentrates on observed or reported interaction over a specified short time frame. Studies by Sanjek (1978) and Garrison (1979), which deal specifically with problems of mental illness, are examples of this approach. Although such time-limited (several days to 2 weeks are commonly used) approaches nicely center data around the behavioral aspects of networks, the method does not typically provide a notion of the total network in either size or general structure. Interestingly enough, Sanjek (1978) has acknowledged that the representativeness of his 4-day "network serials" is uncertain and that long-term variations in social interactions would eventually have to be studied.

Other investigators have attempted to avoid some of the problems of log data by specifying a certain level of frequency with which contact must occur for an individual to be considered a network member. Typically, these frequency criteria involve broader time frames than log methods—for example, monthly (Horwitz 1977; Cohen and Sokolovsky 1978) or yearly (Tolsdorf 1976). In general, however, research using broader time frames still creates static network pictures that ignore what is perhaps the most crucial theoretical issue in understanding the relationship of social networks to altered psychological states: the process of change. With the exceptions of Hirsch's (1979) use of a prolonged log method (27 days consecutively) and our own 3-year study of the total network of a single schizophrenic patient (Sokolovsky et al. 1978), the methodological issue of network process has not been adequately addressed.

Network Analysis Profile

It might seem that there is an unbridgeable gap between research approaches in which network data are collected through mass questionnaires and research approaches relying on detailed observation of behavior. Yet in reality all good methodology involves compromise. In the case of network analysis, the establishment of boundaries by subjective vs. behavioral criteria, the measurement of qualitative vs. quantitative features, and synchronic vs. diachronic descriptions are the poles along which compromises must be sought.

Beginning in 1975 with our studies of released mental patients living in Single Room Occupancy (SRO) hotels, we sought to develop a synthetic research strategy that would be a "best" compromise in meeting the goals of network analysis that have been outlined above. We make no claims of originality, as we have drawn from the techniques of researchers such as Bott (1971, pp. 6–24, pp. 231–237) and Boissevain (1978, pp. 97–146) who, through intensive interviewing, sought to derive the total extent of direct contacts that are involved in ego-centered networks. In this approach, lists of linkages in all areas of social interaction are derived, and a profile of social exchange is then developed by structuring questions around network variables. Other researchers such as Pattison and his associates (Pattison, Llamas, and Hurd 1979), who have produced the most extensive network surveys to date, have developed parallel means of generating characteristics of the bonds that directly link people to their social world. However, an important distinction between our instrument and the Pattison Psychosocial Kinship Inventory is that the latter restricts network membership to "subjectively important people."

A sample of an interactive sector of the Network Analysis Profile is provided in table 1. The Network Analyses Profile elicits in an or-

Table 1. Network analysis profile completed for hotel sector

Name: Ms. T. W

Code Number K126

Form A: Hotel contacts

Directional code:

1. Ego to other
2. Other to ego
3. Reciprocal

Inter-connections Write Form Letter/ Person Number	**Name** 1.Male 2 Female Age___	**Room No.** Or address	**Race** 1.White 2.Black 3.Hispanic 4.Other 9.NA	**Occupational status** 1.Work 2.SS 3 SSI 4 Welfare 5 Pension 9 NA	**Length of link** (years)	**Context of link** 1 Work 2 Friend 3.Kin 4 Hotel 5.Senior center 6 Other 9.NA	**Last saw** 1 Yesterday/ today 2 Past wk. 3 Past mo. 4 Past 6 mo 5 Past yr 6 Past 5 yr 7.Plus 5 yr 9 NA	**Visual contact frequency** 1.Daily 2 Few/wk. 3 1 x/wk 4.1 x/mo. 5.2x/yr 6 1 x/yr. 7.1x/5 yr 8.Less	**Telephone frequency** Same code as prior box	**Time of day of contact** 1.Day 2 Night 3 Day or night 9 NA	**Change: monthly seasonal** 0.None 1 Monthly 2 Seasonal 3 Yearly
A_2	1 Eva, 2 68	Rm. 705	2	3	6	4	1	1	0	3	2—gone 2 weeks in summer

Continued Form A

Content of Relationship													
Visits room Direction 1,2,3	**Meet in lounge**	**Informal conversation**	**Advice** Direction 1,2,3	**Money/ loans** Direction 1,2,3	**Drinking/ drugs** Direction 1,2,3	**Food aid** Direction 1,2,3	**Medical aid** Direction 1,2,3	**Other Aid** Direction 1,2,3	**Eat out together**	**Other social outings** (parks, movies)	**Global importance** 1.Not important 2.Important 3.Very important 4.Most important 9.NA	**Friendship** 1 Not a friend 2.A friend 3 A good friend 4 Best friend 9 NA	**Share intimate thoughts with** 1.Yes 2.No 9 NA
Frequency 0.None 1.1x/mo 2.Less 9 NA	Frequency 0.None 1.1x/mo. 2.Less 9 NA	Frequency 0 None 1.1x/mo. 2.Less 9 NA	Frequency 0.None 1.1x/mo. 2.Less 3.NA	Frequency 0.None 1 1x/mo. 2.Less 9 NA	Frequency 0.None 1.1x/mo. 2.Less 9.NA	Frequency 0 None 1.1x/mo. 2 Less 9.NA	Frequency 0 None 1 1x/mo. 2 Less 9.NA	Frequency 0.None 1 1x/mo. 2.Less 9.NA	Frequency 0 None 1.1x/mo. 2 Less 9.NA	Frequency 0 None 1 1x/mo. 2 Less 9.NA			
Direction 3			3	3	3	3	3	3			4—depend on when I "feel crazy"	4	1—"Don't hold anything back from each other"
Frequency	1	1	1	1	1 $2-5	1 Drink beer	1 Cook for each *other*	2 Care for when *sick*	2 Emotional aid				

NA = Not ascertained.

ganized fashion the three basic dimensions of networks (Leveton, Griffen, and Douglas 1979): *member attributes*, the sociodemographic features of network members such as age, sex, and occupation; *linkage attributes*, all those features that demarcate the nature of transactions flowing from the respondent to a network member; and *network attributes*, the structural nature of the network as a configurational entity.

In developing a picture of the *member attributes* of a network that would be comparable among respondents, we first asked questions about a specific sector of interaction—informal hotel ties, informal outside nonkin, kin, hotel staff, and agency staff. In other settings, we have simply divided the sectors into informal nonkin, kin, and formal ties (Lipton et al. 1981). Although the criteria for inclusion in a network vary according to the interests of the investigator, we began with a minimum requirement of conversational interaction—nonverbal and salutatory interactions were excluded—and that it occurred at least once per month for hotel contacts, every 3 months for outside nonkin, and once a year for kin.

Respondents were first asked to name all persons in a particular sector with whom they had "communicated." We tried to discover additional network members by asking whether the respondent had any activities that involved others. We found it very important to frame such questions in the most positive way possible, asking "Which people in the hotel do you eat with?" instead of "Do you eat with anyone in the hotel?" Within this context, questions were then aimed at discerning the characteristics of network members (e.g., age, sex), the duration and context ("How did it start?") of the link, expected sites of contact (e.g., hotel room, local bar), specific modes of transaction (e.g., casual conversation, medical aid), and, lastly, affective perceptions (e.g., ratings of friendship and intimacy).

With respect to *linkage attributes*, the profile was not meant to be viewed as a formal questionnaire but as a flexible eliciting device that could be adapted to different social settings and to varied levels of qualitative data. It must be noted that the identification of likely types of interaction and the development of the content areas for the Network Analysis Profile were accomplished after 4 months of fieldwork during which we observed and participated in the daily activities of SRO residents. Thus, when we asked about exchange in given content areas, our questions centered around usual transactions—for example the giving and receiving of small loans at the end of the month, when many people ran out of money. Depending on the objectives of the particular research project, the profile could be used to expand greatly the amount and quality of information concerning each linkage attribute. For instance, based on our observation of Ms. I. W. in her room, data were collected far beyond the abstractions in each content box, taking up many pages of field notes on the type of emotional support flowing between Ms. I. W. and Eva. Yet from the "boxed" data one could get a comparative idea of the type of content, its relative magnitude, and the frequency with which it was exchanged (see table 1).

By including contacts limited to conversation or, in the case of kin members, to those with whom a letter was exchanged once a year, we were able to delineate what many would consider "weak" or "minimal" linkages. Nonetheless, this sensitivity of the profile to low-level interaction can be especially important in helping to understand the social functioning of the psychiatrically disabled, who often find it difficult to develop strong or intense relationships.

In dealing with the variables involved in *network attributes*, such as density, we drew a diagram of all contacts, and respondents were then asked to connect those network members who had some communication with each other. Usually this was an appropriate time to probe group dynamics among highly interconnected segments of a network. However, while it was relatively easy to check the reality of these interconnections in the bounded world of the SRO, this was an impossible task with respect to the dispersed network residing outside the hotel walls.

The question of network flux was handled in two ways. In the context of ascertaining linkage attributes, we asked about fluctuations on a daily, monthly, and seasonal basis. Secondly, after the profile was completed, we asked respondents about any significant persons with whom they had lost contact in the last 2 years. For selected individuals (Sokolovsky et al. 1978, pp. 11–12) we also used the current year profile as a baseline for retrospective network reconstruction to examine the mesh of schizophrenic symptomatology and the change in social relationships.

Of the precautions taken to ensure the accuracy of the network profile, perhaps the most important was doublechecking data when profiles were completed for persons whose social linkages overlapped. In cases in which few network members were initially noted, a log of activities which focused on typical scenes of interaction and content of behavior was completed over a 1- to several-day period. Finally, we reviewed key areas of support used to resolve various types of emergencies, such as illness or shortages of food or money.

The profile can be easily understood by inexperienced interviewers. High school, college, medical, and graduate students, as well as psychiatrists and social workers, have been trained in its use. The average training time is 8 to 10 hours. The interrater reliability is high: .83–.92 on various subsections of the profile. The time necessary to administer the profile has ranged from 30 minutes to 6 hours, although it averages 2 hours.

Summary

As an outgrowth of our fieldwork with discharged mental patients, the Network Analysis Profile was designed to overcome the limitations posed by the existing instruments used to measure social interaction. Although it has not resolved all methodological problems, the Network Analysis Profile does permit the collection of the kinds of network data sought by most workers. Some of the advantages offered by the Network Analysis Profile are its ability to:

- Generate large sample sizes.
- Provide quantitive network data (e.g., size, density, degree, and total network configurations).
- Include objectively and subjectively important linkages.
- Be sensitive to varied levels of network interaction (e.g., conversations, as well as exchange of goods and services).
- Provide qualitative network data (e.g., directionality, interactional content, intimacy, "friendship").
- Depict networks over time rather than at one point in time.
- Be easily learned by lay interviewers, expeditiously administered, and highly reliable.
- Be adaptable to clinical and research problems.

References

Barnes, J.A. Class and committees in a Norwegian island parish. *Human Relations*, 7:39–58, 1954.

Boissevain, J. *Friends of Friends*. Oxford: Basil Blackwell, 1978.

Bott, E. *Family and Social Network*. New York: The Free Press, 1971.

Brim, J. Social network correlates of avowed happiness. *Journal of Nervous and Mental Disease*, 158:432–439, 1974.

Cohen, C.; Cook, D.; and Rajkowski, H. "What's in a Friend?" Presented at the 33rd Annual Meeting of the Gerontological Society, San Diego, CA, 1980.

Cohen, C., and Sokolovsky J. Social networks and schizophrenia. *Schizophrenia Bulletin*, 4:346–360, 1978.

Cohen, C., and Sokolovsky, J. Clinical use of network analysis for psychiatric and aged populations. *Community Mental Health Journal*, 15:203–213, 1979.

Craven, P., and Wellman, B. The network city. *Sociological Inquiry*, 43:57–88, 1973.

Epstein, A. The network and urban social organization. *Rhodes-Livingston Journal*, 29:129–162, 1961.

Fisher, C.; Jackson, R.; Stueve, C.; Gerson, K.; Jones, L.; and Baldassare, M. *Network and Places*. New York: The Free Press, 1977.

Garrison, V. Support systems of schizophrenic and nonschizophrenic Puerto Rican migrant women in New York City. *Schizophrenia Bulletin*, 4:561–596, 1978.

Hammer, M.; Makiesky-Barrow, S.; and Gutwirth, L. Social networks and schizophrenia. *Schizophrenia Bulletin*, 4:522–545, 1978.

Hirsch, B. Psychological dimensions of social networks: A multimethod analysis. *American Journal of Community Psychology*, 7:263–277, 1979.

Horwitz, A. Social networks and pathways to psychiatric treatment. *Social Forces*, 56:86–105, 1977.

Killworth, P. Intransitivity in the structure of small closed groups. *Social Science Research*, 3:1–23, 1974.

Killworth, P., and Bernard, H. Informant accuracy in social network data. *Human Organization*, 35:269–286, 1976.

Leveton, L., Griffen, R., and Douglas, T. "Social Supports and Well-Being in Urban Elderly." Presented at the 32nd Annual Meeting of the Gerontological Society, Washington, DC, 1979.

Lipton, F.R.; Katz, S.E.; Fischer, E.; Cohen, C.I. Schizophrenia: A network crisis. *Schizophrenia Bulletin*, 7:144–151, 1981.

Lowenthal, M., and Robinson, B. Social networks and isolation. In: Binstock, R., and Shanas, E., eds. *Handbook of Aging and the Social Sciences*. New York: Van Nostrand, 1976. pp. 432–456.

Mitchell, J.C. *Social Networks and Urban Situations*. Manchester: Manchester University Press, 1969.

Pattison, E.M. A theoretical-empirical base for social systems therapy. In: Foulkes, E.; Wintrob, R.; Westermeyer, J.; and Favazza, A., eds. *Current Perspectives in Cultural Psychiatry*. New York: Spectrum Publications, 1977. pp. 217–253.

Pattison, E.M.; Llamas, R.; and Hurd, G. Social network mediation of anxiety. *Psychiatric Annals*, 9:56–67, 1979.

Sanjek, R. A network method and its uses in urban ethnography. *Human Organization*, 37:257–268, 1978.

Sokolovsky, J.; Cohen, C.; Berger, D.; and Geiger, J. Personal networks of ex-mental patients in a Manhattan hotel. *Human Organization*, 37:5–15, 1978.

Sokolovsky, J., and Cohen, C. Being old in the inner-city: Support systems of the SRO aged. In: Fry, C., ed. *Dimensions of Anthropology and Aging*. Brooklyn: Bergin, in press.

Tolsdorf, C. Social Networks, support and coping: An exploratory study. *Family Process*. 15:407–417, 1976.

Tolsdorf, C. "The Multiproblem Family: Stress, Support, and Coping in the Social Network." Presented at the 86th Annual Meeting of the American Psychological Association, Toronto, Ont., 1978.

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