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The Sociology of Social Networks

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Chapter 20: The Sociology of Social Networks

[p. 1-208 ↓]

Social networks have come to take on prominence in sociology, other academic disciplines, many policy areas, and even in the public discourse in recent years. “Networking,” “six degrees of separation,” “social support,” and “social capital” have been adopted in the business world, among poets and playwrights, and among friends. Yet the diffusion of the underlying terms and concepts from a social network perspective has produced both acceptance and confusion in academic and community circles. Simply stated, a social network is a “structure of relationships linking social actors” (Marsden 2000:2727) or “the set of actors and the ties among them” (Wasserman and Faust 1994). Relationships or ties are the basic building blocks of human experience, mapping the connections that individuals have to one another (Pescosolido 1991). As network theorists claim, the structure of these relationships among actors has important consequences for individuals and for whole systems (Knoke 1990).

Some sociologists see social networks as the essence of social structure (Burt 1980); others see social structure governing these networks (Blau 1974); still others see networks as the mechanism that connects micro and macro levels of social life (Coleman 1990; Pescosolido 1992). To many, the power of network explanations lies in changing the focus of social structure from static categories such as age, gender, and race to the actual nature of the social contacts that individuals have and their impact on life chances (White 1992; Wilson 1987, 1996). In any case, there is a clear link between networks and sociology’s central concerns with social structures and social interaction.

The Roots of a Social Network Perspective in Sociology

Despite the many varieties of “sociology” in contemporary theory, the role of social interactions may be the single commonality (Pescosolido 1992). Social relationships have always been at the heart of sociological understandings of the world. Many sociologists trace the introduction of the structural approach to social interactions to Georg Simmel (1955) in *Conflict and the Web of Group Affiliations* (Pescosolido and Rubin 2000; White, Boorman, and Brieger 1976). In this work, Simmel (1955) began with the classic statement, “Society arises from the individual and the individual arises out of association” (p. 163). Like the founding sociologist, social interaction was the currency that set Simmel's work apart from other social sciences and philosophies. In Durkheim's (1951) *Suicide*, for example, two types of social interaction (integration and regulation) were seen as combining to create four distinct types of social structures (anomic, fatalistic, altruistic, and egoistic), which shaped the behavior of individuals who lived within them. To map these social structures, Durkheim referred to different kinds of “societies,” social groups or institutions such as the family, polity, or religions. While consistent with a network approach, Durkheim's approach was more implicit than explicit on social ties (Pescosolido 1994).

Simmel suggested that it was the nature of *ties* themselves rather than the social group per se that lay at the center of many human behaviors. In his attempt to [p. 1-209 ↓] understand the transition from agrarian to industrial society, Simmel discussed two ideal configurations of social networks, commonly referred to as the “premodern” form of concentric social circles and the “modern” form of the intersection of social circles. For each, Simmel described and considered their effect on individuals, including the way personality and belief structures are formed. Briefly, social networks in premodern society were encapsulating and comforting but often intolerant of outsiders (Blau 1993; Giddens 1990). They provided a sense of security and solidarity, which minimized psychological “tensions” for the majority of individuals. Yet such a structure, as Simmel noted, limited freedom, individuality, and diversity. These networks were, as Suchman (1964) was later to call them, “parochial.”

Modern society brought “cosmopolitan” networks characterized by intersecting circles. The transition to modern society allowed individuals to increasingly participate in a greater number of networks with more numerous, but fewer multistranded, ties (Blau 1977). Individuals craft unique personalities that stand at the intersection of all the social networks they have inherited and built (Burt 1976). Individuals are more unique and tolerant.¹ But with greater choices possible, individuals deal with greater uncertainty and less support (Giddens 1990; Maryanski and Turner 1992).

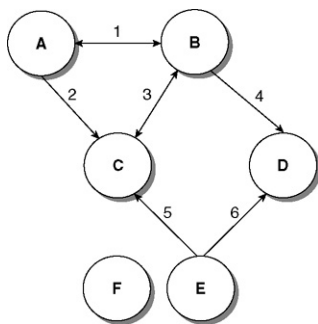
Sociological research continued to develop, making heavy use of Durkheim and referring less often to Simmel's network perspective. However, in the 1930s, J. L. Moreno (1934), a psychiatrist and a prolific writer, published *Who Shall Survive? Foundations of Sociometry, Group Psychotherapy, and Sociodrama*. This work marked the major reemergence of the social network metaphor into sociology and, equally important, across the social sciences and into social policy. Working within the context of a girls' school of the time, Moreno and his colleagues developed sociometric techniques that mapped the relationships among individuals (e.g., Jennings 1943; Moreno and Jennings 1938). The goal was not only scientific but pragmatic, with Moreno (1934) using network data to develop “interpersonal therapy,” discussing its use with national leaders, including then president Franklin D. Roosevelt.

Moreno laid out a dictionary of network terms, many still used in the same way today (see the next section). More important, the sociogram, a visual technique that graphed the ties between social actors, became the main analytical tool of sociometry. For the first time, these pictures of social relationships made clear the structure of friendships, leadership, and classrooms (Jennings 1943; Northway 1940). Each individual was represented by a circle with lines showing connections and arrowheads indicating whether the tie was sent or received (see [Figure 20.1](#)).

As the number of cases increased, and the technique was applied to housing units and communities as well as individuals, the sociograms became increasingly difficult to read and understand (e.g., see Barnland and Harlund 1963). This was complicated by attempts to introduce other factors, such as sociodemographics or tie intensity, into the graphs. While sociograms continued to appear, these limits saw the graphic approach fall into disuse, and with it, much of the intellectual force that the network approach

had brought to sociology. The introduction of graph theory in the 1940s led to the development of mathematical techniques to deal with large networks (Harary, Norman, and Cartwright 1965) and forced Moreno to the sidelines. While Freeman (2004) refers to this period through the 1960s as the “Dark Ages,” balance theory formalized the study of network influences and dramatically influenced theory and data collection in social psychology (e.g., Newcomb 1961).

Figure 20.1 Representation of Network Ties in a Sociogram



The next important break came in the 1970s, when Harrison White and colleagues developed new principles to rethink the analysis of network data. Using matrix algebra and clustering techniques, block modeling (White et al. 1976), the essential insight of their approach, rested on five basic ideas.²

But the development of the Harvard School represented more than an answer to an analytical problem. It began a resurgence of theoretical interest in sociology that was limited to neither the kinds of data nor the analytical techniques developed by White and his colleagues. For example, both Granovetter's (1982) strength-of-weak-ties concept and Fischer's (1982) documentation that urban alienation was thwarted because people live their lives in small worlds, had roots in this environment. Such a review is not meant to imply that other important work across the social sciences was lacking or should be dismissed. In England, Bott's (1957) work on social networks in the family was seminal; in psychology, Milgram (1967) traced chains of connection in “small worlds”; in medical [p. I-210 ↓] sociology, Kadushin's (1966) “friends and supporters of psychotherapy,” Suchman's (1965) “parochial versus cosmopolitan” network distinction, and Rogers's

(1971) similar distinction between “localities” and “cosmopolities” became the mainstays of theoretical development and research agendas.

Nonetheless, the developments at Harvard under Harrison White revived interest in social networks, stemming from the realization that the magnitude of social structural problems could now be matched with adequate theoretical and analytical tools. Carrington, Scott, and Wasserman (2005) saw another recent but unexplained spike in network research and interest beginning in the 1990s. This resurgence captured not only the social sciences but also epidemiology, administrative science and management, physics, communications, and politics. Barabasi (2003) contends that the increased emphasis on networks reflects a broad-based realization that research, traditionally (and successfully) searching for “pieces” of social and physical life, could not consider these pieces in isolation. This recognition, he argues, comes in the wake of the emergence of the Internet with its focus on networks (see also Wasserman 2003; Wellman and Gulia 1999). Paralleling these efforts is the development of a wide range of network analytical techniques catalogued in *Network Analysis* (Wasserman and Faust 1994) and recent additions in *Models and Methods in Social Network Analysis* (Carrington et al. 2005).

Main Contributions: Principles Underlying the Social Network Perspective

There is no single network “theory”; in fact, Knoke (1990) sees this as unlikely and even inappropriate. The network approach is considered by most, who use it as more of a perspective or frame that can be used to develop specific theories. Yet sociologists share, across studies, basic principles that often underlie much research using a network frame and guide the development of specific investigations and analyses.³

Further, individuals’ social networks are not divorced from the body and the physical/mental capacities that individuals bring to them (Leventhal, Leventhal, and Contrada 1997; Orlinky and Howard 1987; Rosenfield [p. 1-212 ↓] and Wenzel 1997). As Fremont and Bird (2000) report, when social interactions are the source of social stress, the impact appears to be more devastating in magnitude (see also Perry 2005b).

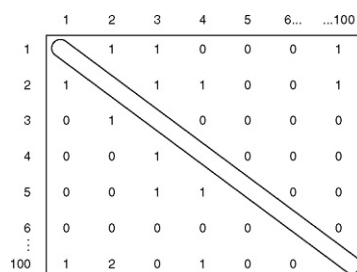
Social psychological characteristics (e.g., self-reliance) may also influence the effect of network ties. Biological challenges may lie at the heart of dramatic changes in individuals' social network systems both for those affected directly and for caregivers (Dozier 1993; Dozier, Cue, and Barnett 1994; Lysaker et al. 1994; Rosenfield and Wenzel 1997; Sutor and Pillemer 2002). It has long been known that children with physiological or neurological deficits have difficulties in establishing social relationships (Perry 2005b). Sociologists know that these early social relationships affect adult educational outcomes (Entwisle, Alexander, and Olson 2005).

Networks may also affect biology. In trying to understand why social networks matter—for example, in cardiac health—researchers have linked constellations of social networks to biological processes (e.g., plasma fibrinogen levels; Helminen et al. 1997). Furthermore, social support has been shown to influence the phenotypic expression of genetic predispositions (Caspi et al. 2002).

Network Basics

Even with some agreement on network foundations, a myriad of concepts and approaches confront the network approach with the necessity of clarifying terms (see also Monge and Contractor 2003). The most frequently referenced terms are briefly described below. This is neither an exhaustive nor a technical lexicon of network terminology; rather, the goal is to provide an orientation to network language and its basic variants.

Figure 20.2 Representation of Network Ties with a Sociomatrix



Four Traditions or Approaches

Part of the complexity of understanding the contributions and future directions of social network research in sociology lies in the different ways in which the idea of network ties has been incorporated in research. The approaches have also been characterized by differences in theoretical starting points, data requirements, and methods of data collection. In this sense, they are not strictly different traditions but nonetheless represent different strands of research. They continue to use different terms and draw only sporadically from one another (Thoits 1995).

The first two represent quantitative traditions. The *complete or full* network approach attempts to describe and analyze whole network system. The *local or ego-centered approach* targets the ties surrounding particular individual actors. The *social support* perspective is more general and theory oriented, often using network imagery but tending to focus on the overall state of an individual's social relationships and summary measures of networks. The *social capital* perspective is the most recent, focusing on the “good” things that flow along network ties (i.e., trust, solidarity), which are complementary to the more economically focused human capital (e.g., education; Lin 2000).

As Wasserman and Faust (1994) note, the first question to ask and the one most relevant to distinguish many of these traditions is “What is your population?”

The Whole, Complete, or Full Network Approach

This tradition, in many ways, represents the “purest” approach. Here, all network ties among members of a population are considered. This allows for a mapping of the overall social network structure. And the most advanced techniques have been developed to determine and describe that structure. Full networks have been described in hospitals (Barley 1986), elite or ruling families (Padgett and Ansell 1993), laboratory groups and other scientific collaboration (Breiger 1976; Powell et al. 2005), business

structures (Galaskiewicz et al. 1985), world trading partners and global economic systems (Alderson and Beckfield 2004; Snyder and Kick 1979), policy-making systems (Laumann and Knoke 1987; Laumann and Pappi 1976), and schools (Bearman et al. 2004).

In keeping with Wasserman and Faust's (1994) questions, this approach requires that the universe of network members can, in fact, be delineated. That is, it must first be possible to list all the members of the social structure in question and to elicit, in some way, the ties or bonds that exist among them. To make the analysis effective, data must be collected from all members of the population. While assumptions can be made to fill in missing data (e.g., assume that ties are reciprocal), this solution becomes more questionable as the response rate decreases even to levels considered acceptable for nonresponse in surveys. Furthermore, unlike regression techniques, there [p. 1-214 ↓] are no well-established and tested options to deal with missing data. These requirements for defining the population and having nearly 100% response or completion rates make this approach unfeasible for many questions.

However, problems that can be matched to these stringent data requirements have at their disposal a rich range of possibilities for analysis. This analysis of complete network data begins with the construction of the sociomatrix or adjacency matrix of the type depicted in [Figure 20.2](#), which lays out all ties. The data can be summarized across rows and columns in a number of ways, and individuals can be clustered together to examine clique structures or blocks. For example, in the block model approach (White et al. 1976), the assumption of structural equivalence is used to bring together columns of data that share *both* a similarity of ties and an absence of ties. As an illustration, in [Figure 20.3](#), Panel A, an original matrix of zeros and ones for 100 actors has been clustered into four blocks of structurally equivalent social actors. Essentially, in this reordered matrix, the rows and columns have simply been reassigned from their original position in [Figure 20.2](#) into blocks that reflect groupings (e.g., within the first block, the social actors with original IDs 1, 10, 11, 14, 77, and 81 have been grouped together based on the similarity of ties). Within each block of this new matrix, called the density matrix, the percentage or proportion of ones (indicating the presence of ties of the number possible) has been computed. So, for example, among the social actors in Block 1, 60% of the possible ties that can exist do exist. This indicates that this block may, in fact, be a clique or subgroup. However, only 10% of the ties that can exist

between Block 1 and Block 3 have actually been recorded, indicating that those actors in Block 1 *do not* tend to be connected to those in Block 3.

The interpretation of the block structure begins with a conversion of the block proportions into ones and zeros. In the most stringent analysis, the cutting point between ties and no ties is a pure zero block (no ties). However, as can be seen in this more typical result, there are no such blocks (though Blocks 3 and 4 come close). The conversion from a density matrix to an image matrix, in most cases, requires a decision about an acceptable cutting point, which is often facilitated by having a good knowledge of the data collection setting. In the absence of that information (and often when the site is familiar), the conversion depends on the analyst's decision. Here, one choice might be to use a cutting point of 0.4 or above. A more stringent choice might be 0.6 or above. [Figure 20.3](#), Panel B, uses the less stringent 0.4 criteria to represent the image matrix. There is no statistic that can determine either the proper number of blocks or the density cutting point, making the decision making relatively arbitrary.

To this point, then, actors were partitioned into structurally equivalent sets with the density of ties computed, and the structure of relationships was mapped into a set of images indicating whether subgroups exist and how they related to other blocks. To get a better sense of the [\[p. I-215 ↓\]](#) structure of relationships, a sociogram can be constructed using the blocks, not actors, as nodes in the diagram ([Figure 20.3](#), Panel C). The actors in Blocks 1, 2, and 4 appear to form subgroups because they send and receive ties to each other. Note, however, that the individuals in Block 4 are similar only in the patterns of their ties to other actors but do not in themselves form a subgroup. This also suggests that this group may be of lower prestige since they send ties to all other groups but do not receive ties in return (i.e., asymmetry). Furthermore, only the actors in Blocks 1 and 2 have a mutual relationship.

Figure 20.3 Hypothetical Density, Image, and Socio-Matrix from a Block Model Analysis of a Complete Network

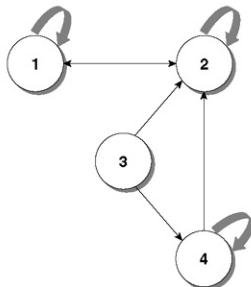
Panel A

	1	2	3	4
1	1			
2	.60	1		
3	.40	.90	1	
4	.10	.14	.67	1

Panel B

	1	2	3	4
1	1	1	0	0
2	1	1	0	0
3	1	1	0	1
4	0	1	0	1

Panel C



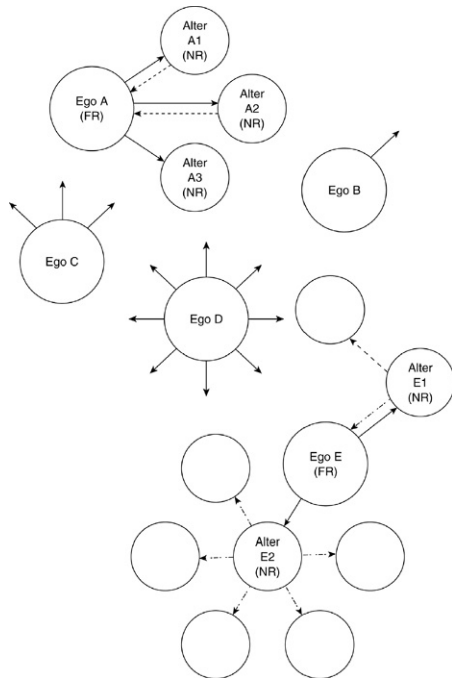
In sum, the complete network tradition is concerned include Ego E among them. Such relationships have theo-with the structural properties of networks at a global or retical implications for both the stability and the durability whole level (Doreian, Batagelj, and Ferligoj 2005). The of each ego's network support system as well as for the primary issue in taking this approach is the identification ability of each caregiver to experience "burnout" (e.g., of the boundaries of the network, which requires answer-Suitor and Pillemer 2002). ing the question "Who are the relevant actors?" (Marsden 2005; Wasserman and Faust 1994).

The Local or Ego-Centered Approach

If the first approach is the purest, then this approach is the most typical. While data requirements may be less strict, there are more limits to what can be done analytically. Here, the focus is on a set of social actors who are defined as a sample. The effort centers on gathering information about the network from the standpoint of the social actors situated within it (Marsden 2005). Since it is impossible to include, for example, all individuals in a large community, each social actor is asked about his or her own ties. In [Figure 20.4](#), each social actor (A, B, C through E of a small to very large N) was selected under some purposive sampling plan, whether a random sample, deliberate sample, or convenience sample. Here, each selected social actor (A through E) is typically asked to list other social actors in response to a name generator. This list may record all the individuals with whom a respondent is friends, loans money to, receives money from, and so on. The first case (Ego A) names three alters, Ego D names seven, and Ego B lists only one. In some cases, the individuals who are named may also be contacted using a snowball sampling technique (see [Figure 20.4](#), Egos A or E). The original respondents may be called egos or focal respondents (FRs), while those they name, who are followed up, may be called alters or network respondents (NRs) ([Figure 20.4](#)).

The NRs may be asked about the networks that the original FR has, perhaps for corroboration or theoretical purposes (Pescosolido and Wright 2002). In this case, the dashed line indicates that Alter A1 does, in fact, have a relationship with the FR or ego, as does Alter A2. However, Alter 3 indicates no such tie to FR A. Finally, the alters may also be asked about their own ties. In caregiver research, it is a typical strategy to ask “Who cares for the caregivers?” Here, as indicated by the dotted lines, Ego E reports two network ties (Alters E2 and E1). They, in turn, have reported their ties. E1 mentions two actors, including the original person (Ego E). However, Alter E2 mentions five supporters but does not include Ego E among them. Such relationships have theoretical implications for both the stability and the durability of each egos network support system as well as for the ability of each caregiver to experience “burnout” (e.g., Suitor and Pillemer 2002).

Figure 20.4 Representation of Network Ties in a Sociogram



While more limited network mapping can be done compared with complete network data, factors such as the size [p. 1-216 ↓] (as a count of mentions), density (by asking the FRs to indicate whether each NR they mention as a tie knows each other tie), or reciprocity (by asking the FRs if they also provide friendship, assistance, etc., or by asking the NRs in a first-stage snowball) can be constructed and used to test theoretical ideas about the influence of social networks. Attribute information can be collected on each tie (e.g., gender, age, ethnicity, attitudes), which can be used to examine, for example, the influence of network homogeneity on structural and context issues. Even the interaction of network size and content, noted earlier (Principle 5), can be operationalized, though recent methodological concerns surround the appropriate construction of such interactions (Allison 1978; Long 1997; for substantive examples of different approaches, see Pescosolido, Brooks-Gardner, and Lubell 1998; Pescosolido, Wright, et al. 1998).

The Social Support Approach

This tradition, unlike the two described above, comes primarily from a social psychological, rather than a structural, perspective. As Thoits (1995) notes, social support is the most frequently studied psychosocial resource and has been documented to be a powerful influence, for example, in occurrence of and recovery from life problems. While social support is seen similarly as resources available from family, friends, organizations, and other actors, researchers here tend to use a summary social integration strategy, looking less to network structures (Barrera 1986). Emanating from a concern with actors' responses to stressful situations, social support is considered a social reserve that may either prevent or buffer adverse events that occur in people's lives (Pearlin and Aneshensel 1986).

Social networks represent one component of social support (House, Landis, and Umberson 1988), in contrast to the structural perspective that tends to see social support, conversely, as a possible type of tie, a resource that flows over ties, or content that may or may not occur (Faber and Wasserman 2002; Wellman 1981). However, the social support tradition does not ignore structure altogether, noting that indicators of structural support (i.e., the organization of an individual's ties in terms of size, density, multiplexity) are important (Barrera 1986). Yet the focus in this approach is on the sustaining qualities of social relationships (Haines, Beggs, and Hurlbert 2002). Researchers tend to ask study respondents whether they have/had enough support in everyday life issues or critical events. Questions may target either perceived social support (i.e., the belief that love, caring, and assistance are potentially available from others; latent networks in the structural tradition) or received support (i.e., the actual use of others for caring, assistance, appraisal [Thoits 1995], activated networks in the structural tradition). In fact, social support research has documented that perceived support is more important than actual support received (House 1981; Turner and Marino 1994). Even more surprising, Cohen and Wills (1985) suggest that the simplest and most potent indicator is whether individuals report that they have a single intimate tie in which they can confide.

The Social Capital Tradition

According to Monge and Contractor (2003), the ideas underlying the investigation of social capital were introduced in the 1980s to refer to resources that accrue to social actors from individuals to nations as a result of networks (Bourdieu and Wacquant 1992; Coleman 1990; Lin 2000)—that is, because individuals participate in social groups, there are benefits to be had. Individuals invest in and use the resources embedded in social networks because they expect returns of some sort (Lin 2000). Resources are not equally available to all individuals but are differentially distributed across groups in society (Lin 2000). Thus, social capital in the form of trust, social norms of reciprocity, cooperation, and participation resides in relationships, not individuals, and therefore shares roots with many aspects of classical sociology and other network traditions (Paxton 2002; Portes 1998).

Although some contend that the social capital approach brings no novel ideas to network perspective, offering only a “more appealing conceptual garb” (Portes 1998; see also Etzioni 2001; Wilson 2001), three unique aspects of this approach are notable. First, more than the other traditions, social capital research has been popularized to describe the state of civil society (e.g., Putnam's [1995] concept of “bowling alone”) or differing geographical areas (e.g., neighborhoods, Rahn 2004) and to relate to large public policy issues. For example, Wilson (2001) suggests that social networks constitute social capital to the extent that they contribute to civic engagement. As such, these resources can be measured at multiple levels (the individual, the neighborhood, the nation), a measurement task difficult under the other traditions. Social capital data have been collected in a variety of ways, from the number of positive networks or connections that individuals have to overall geographical characteristics (e.g., migration rates, voting rates). Second, social capital focuses attention on the positive qualities (though not necessarily consequences) of social ties, downplaying the potential “dark side” of networks. As Edwards and Foley (2001:230) note, social capital comes in three “flavors”—good, better, and best. From a social network perspective, this aspect is perhaps the most troubling. Like the social support tradition, this emphasis on positive contents limits the theoretical import of ties. Third, the social capital approach has broadened the appeal of a network perspective to those in other social science

disciplines outside sociology. By providing sociability that is parallel to “human capital” and “fiscal capital,” the introduction of social capital reinforced the sociological thesis that social interaction can have powerful effects on actors.

These unique contributions produce other curious corollaries. Because of its affiliation with other forms of [p. 1-217 ↓] “capital,” the social capital tradition has been more likely to adopt a rational choice foundation. Social capital theorists often talk about the costs and benefits of establishing ties, as well as how and why actors deliberately construct or maintain ties in the service of creating opportunities and resources. This discussion of “investment strategies” or “fungibility,” “opportunity costs” or “resources to pursue interests” (Baker 1990), does not question the self-interested and antisocial nature of individuals, a debate in sociology still not settled by those who see an inherent sociability. By basing the perspective in the notion of purposive action (Lin 1999), the roles of “habitus” and emotions are underplayed, if not absent, in the rational choice perspective that undergirds most social capital research (Pescosolido 1992).

The Future of Social Networks: Challenges and Opportunities

The network perspective poses many challenges to routine ways of doing sociological research. Two seem to be most pressing. The first entails questions about social networks themselves, their dynamics, and how the network approach might be integrated into the life-course approach. Such questions include the following: To what extent do ties persist? Why do some persist more than others? How do changes affect actors’ networks and intersect with larger changes in society? How are network dynamics intertwined with change in other life arenas? (Pescosolido and Wright 2002; Suitor et al. 1996). The second topic addresses the interplay of social and biological forces. The biological and social network interaction across the life course represents some of the most recent considerations that have been posited (Elder 1998b; Giele 2002; Klovdahl, Graviss, and Musser 2002; Shonkoff and Phillips 2000). Relevant questions include the following: How are social networks shaped by and shape lives through psychological and biological processes? Can we understand what happens

in social life by reference to the limits that social networks, genetics, personality, and biology set for one another?

Patterns, Pathways, and Trajectories of Networks and Their Influence

The life-course perspective views lives as organized socially across both biological and historical time (Elder 1998b; see also Werner 2002). The social network perspective suggests that what links the lives of individuals to the time and place in which they live are their connections to others (Kahn and Antonucci 1980). However, these interactions can exist at many levels—individuals interacting with other individuals, individuals interacting within large social groups or organizations, and individuals interacting in larger climates or contexts that may differentially affect outcomes. Simultaneously embracing the dynamics and multiple levels of the life course—that is, understanding social networks as attached to time and place—reveals a complex interplay of forces to be examined. If social networks mark the social interdependence that continuously shapes and redirects lives, then exploring how they play a role in pathways, trajectories, and transitions becomes critical (Elder 1985; Moen, Robison, and Dempster-McClain 1995; Pavalko 1997; Werner 2002).

The Multidisciplinary Evolution and Prominence of Social Networks

From its beginning, the network approach has been embraced by a variety of social science disciplines, particularly anthropology (e.g., Barnes 1954; Bott 1957; Mitchell 1969). The network approach has come to be a major force in the areas of health and medicine (Levy and Pescosolido 2002); communications research (Monge and Contractor 2003); mathematics, physics, and other sciences (Barabasi 2003; Watts 2003); and political science (Fowler and Smirnov 2005; Huckfeldt and Sprague 1987; Rahn 2004). Yet these areas remain unconnected. Taking seriously the life-course

perspective's principle of "linked lives" (Elder and Pellerin 1998; Werner 2002), the network perspective offers a way to synthesize disciplinary insights.

While network theory may reject focusing on individuals alone, mental events, cognitive maps, or technological determinism (White 1992), identity, cognition, technology, and biology may be intertwined in complex ways. Agenda-setting reports on health and medicine, for example, have embraced this possibility. In an Institute of Medicine report, *From Neurons to Neighborhoods* (Shonkoff and Phillips 2000), social network relationships are viewed as the "fundamental mediators of human adaptations" and the "active ingredients of environmental influence." Yet the response of sociology in leading the theoretical agenda has been slow. If we see, as Castells (2000) suggests, that social structure is made up of networks in interactions that are constantly on the move, similar to self-generating process images in molecular biology, sociologists' familiarity with conceptualizing multilevel, dynamic processes becomes essential to understanding social life.

Notes

1. For contemporary network theorists, these ideas continue to be central. Social networks constitute social spaces among identities and provide the structure that links social interaction and society (Stryker 1980; White 1992:70). Coser (1991:25) echoes this and Simmel's original ideas by arguing that multiple statuses essentially enrich social worlds by granting individuals greater autonomy.

2. First, actors were to be partitioned into sets of relationships that depended on more than the *presence* of social ties. Second, following from this, the *absence* of ties was pivotal to understanding the structure of social networks. Third, to get at this structure, many different types of ties (e.g., advice, authority, friendship), rather than one, would be preferable. Fourth, the nature of those ties would be inferred from clustering individuals with similar patterns of both the presence and the absence of ties. Finally, the search for structure would focus on the identification of *zero blocks*, clusters defined by the absence of ties. Thus, in their approach, the role of negative spaces helped solve analytical problems and led to the development of important concepts (e.g., "structural holes"; Burt 2001).

3. An earlier and more specific version of these principles addressing the challenge of illness and disability appears in Pescosolido (1991).
4. Given the dynamic nature of social networks and concerns that some may be fleeting or based only on weak bonds of affiliation (Granovetter 1982), a major concern in pursuing the network research agenda has been whether reports of social network ties are accurate and can be measured with reasonable scientific precision (see Marsden 2005 on these issues).
5. According to Cederman (2005), such agent-based modeling allows for experimentation within which agents interact and create social environments (see also Robins and Pattison 2005).

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Further Reading

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