

**Organizational Social Network Research:**

Core Ideas and Key Debates

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**Abstract**

Given the growing popularity of the social network perspective across diverse organizational subject areas, this review examines the coherence of the research tradition (in terms of leading ideas from which the diversity of new research derives) and appraises current directions and controversies. The leading ideas at the heart of the organizational social network research program include the following. First, there is an emphasis on relations between actors. The second leading idea is the embeddedness of exchange in social relations. Third, is the assumption that dyadic relationships do not occur in isolation, but rather form a complex structural pattern of connectivity and cleavage beyond the dyad. Fourth, is the belief that social network connections matter in terms of outcomes to both actors and groups of actors across a range of indicators. These leading ideas are articulated in current debates that center on issues of actor characteristics, agency, cognition, cooperation versus competition, and boundary specification. To complement the review, we provide a glossary of social network terms.

Organizational social network research has achieved a prominent position in our field as evidenced by the many social network conferences, by special issues appearing in our major journals, and by the sheer volume of work that uses network ideas (Borgatti, Mehra, Brass, & Labianca, 2009). It is perhaps time to take stock of where organizational network research is going. Will this burgeoning popularity be accompanied by a loss of identity or by other related problems of success? The network approach traditionally defined itself as an alternative to rival approaches such as economics (e.g., Granovetter, 1985) but now some prominent commentators seek to merge the social network tradition with such perspectives (e.g., Grabher & Powell, 2004). The network perspective has been extended (and, perhaps, changed) in both micro directions, emphasizing cognitive and personality perspectives (e.g., Kilduff & Tsai, 2003), and macro directions, emphasizing very large network configuration and evolution (e.g., Powell, White, Koput, & Owen-Smith, 2005). These new developments alert researchers to new phenomena but also challenge the coherence of the overall research tradition.

One of the major appeals of the network approach is the distinctive lens it brings to the examination of a range of organizational phenomena at different levels. For example, at the macro level, topics include interfirm relations (Beckman, Haunschild, & Phillips, 2004; Westphal, Boivie, & Chng, 2006), alliances (Gulati, 2007; Shipilov, 2006), interlocking directorates (Mizruchi, 1996), price-fixing conspiracies (Baker & Faulkner, 1993), organizational reputation (Rhee & Haunschild, 2006), initial network positions (Hallen, 2008), and network governance (Provan & Kenis, 2007). At the micro level, topics include leadership (Pastor, Meindl, & Mayo, 2002), teams (Reagans, Zuckerman, & McEvily, 2004), social influence (Sparrowe & Liden, 2005), interpersonal trust within organizational contexts (Ferrin, Dirk, & Shah, 2006), employee performance (Mehra, Kilduff, & Brass, 2001), power (Brass,

1984), turnover (Krackhardt & Porter, 1985), attitude similarity (Rice & Aydin, 1991), promotions (Burt, 1992), diversity (Ibarra, 1992), creativity (Burt, 2004; Perry-Smith, 2006), innovation (Obstfeld, 2005), conflict (Labianca, Brass & Gray, 1998), and organizational citizenship behavior (Bowler & Brass, 2006).

Further, we note the tendency for traditional management subfields (e.g., strategy, organizational behavior, organizational theory) to offer their own focused summaries of network research (e.g., see the different chapters in Baum, 2002). As organizational social network research evolves into a heterogeneous field of sub-topics, collaborative dialogue across these different subject areas becomes difficult. The growing popularity of the network approach, therefore, may have come at the cost of programmatic coherence. What had been hailed as a distinctive paradigm in the social sciences that could revolutionize research and thinking (Hummon & Carley, 1993) may be in danger of attaining the status of an umbrella term (Hirsch & Levin, 1999) that stretches across a great many disparate endeavors that have little in common. Or will the divergence foster competitive debate that propels further progress?

Certainly, in looking at the current state of the research program, we recognize that it encompasses a great number of topics at different levels of analysis, making it difficult to see the coherence within the diversity. One of the aims of this article is to identify core ideas that represent the basis from which such diverse research proceeds in the articulation of new theory and the identification of new phenomena; and to review currently lively controversies with respect to actor characteristics, agency, cognition, cooperation versus competition, and boundary specification.

We do not attempt another conventional survey of organizational network research given the prevalence of both specialist reviews -- covering such topics as social capital (Bartkus &

Davis, 2009; Lee, 2009; Lin, Cook & Burt, 2001), inter-organizational links within whole networks (Provan, Fish, & Sydow, 2007), cross-level research (Ibarra, Kilduff, & Tsai, 2005), leadership (Balkundi & Kilduff, 2005), job design (Kilduff & Brass, 2010), and terrorist networks (Eilstrup-Sangiovanni & Jones, 2008); and general reviews (e.g., Borgatti & Foster, 2003; Brass, 2010; Brass, Galaskiewicz, Greve, & Tsai, 2004; Monge & Contractor, 2003; Porter & Powell, 2006). Rather, we ground our discussion in the social network core ideas from which new theory and new research derive. It is these ideas that provide the coherence and theoretical direction for organizational social network research.

### **Leading Ideas**

Not all research areas in the social sciences develop the coherence and dynamic capability characteristic of progressive research programs. A progressive research program is characterized by the combination of a core set of leading ideas and the competitive articulation of these ideas in terms of new theories that signal new phenomena that demand new measures and analytical techniques (Lakatos, 1970; cf. Laudan, 1977). These leading ideas at the heart of a research program are protected from refutation by auxiliary assumptions and by "protective belt" theories that can themselves be challenged and changed in an ongoing process of progressive new theory development (Lakatos, 1970). Interpreting the leading ideas to produce new theory and articulating associated new research directions constitutes a major part of the research within the social network community.

Leading ideas that drive scientific research programs tend to emerge over time as research programs define themselves against competing programs. The core ideas themselves are subject to creative interpretations and definitions. Debates concerning the meanings of core ideas propel the research program forward in terms of new theory. Of course, as part of any ongoing

research program there is a parallel process devoted to the development of measures, algorithms, definitions, and procedures by which leading ideas can be tested, discussed, and displayed. But our emphasis is on leading ideas rather than the mathematical or graphical innovations inspired by leading ideas.

What are the leading ideas that distinguish organizational social network research from other types of research? There are at least four interrelated leading ideas that have generated influential debates and empirical work. These are: an emphasis on *relations between actors*, a recognition of the *embeddedness* of exchange in social relations, a belief in the *structural patterning* of social life, and an emphasis on the *social utility* of network connections. These four leading ideas are at the core of the social network research program and have evolved over time from intellectual traditions in psychology, anthropology and sociology. Note that these four ideas overlap and interweave with each other, but that each idea represents a basis for social network research and theory-driven problem solving (cf. Laudan, 1977).

### **Relations between actors**

The most commonly-invoked core idea that distinguishes organizational social network research from its theoretical competitors is an emphasis on relations between actors. From the early beginnings of organizational network theorizing (e.g., Tichy, Tushman, & Fombrun, 1979) to more recent surveys (e.g., Brass et al., 2004) researchers emphasize that social network analysis involves the study of a set of actors and the relations (such as friendship, communication, advice) that connect or separate them (Kilduff & Tsai, 2003: 135). In Figure 1 we depict friendship relations among a set of minority students in an MBA program. The figure is useful in illustrating the importance of the presence and absence of social relations among actors. For example, we can see that the relations among African American students are

particularly numerous, and that these relations are clustered around Bill, whereas the relations of other students, such as Jen, serve to bridge across the gaps between different groups of students, promoting the overall connectivity of the network. The continuing emphasis in social network research on how relations link some but not all actors in a network derives much of its intellectual capital from prior social psychology including the sociometric tradition (e.g., Moreno, 1934) and the Gestalt tradition of experimental studies of actors in their social context (e.g., Heider, 1946; Lewin, 1936).

Thus, a recent review (Borgatti et al., 2009) reminded us that early work on social networks (Moreno, 1934) illustrated the importance of social relations through an analysis of runaways from a custodial school in upstate New York. All the runaways were connected to each other through affective bonds both within and across dwelling units. This theme of people leaving organizations and influencing the departure of others to whom they are connected was revived in the 1980s in an examination of how people were induced to leave by the departure of others who occupied similar positions in organizational advice networks (Krackhardt & Porter, 1986). Another example of research focused on relations between individuals examined whether people at an organizational "mixer" follow through with their intentions to meet new people (Ingram & Morris, 2007). At the inter-organizational level, a study of 230 private colleges in the US during the 1971-1986 time period showed that strong ties between organizations promote adaptation and learning while mitigating uncertainty (Kraatz, 1998).

Prior researchers in the field of sociology (e.g., Erickson, 1988) tended to follow Durkheim in defining the network approach almost exclusively in contrast to approaches that invoked actor attributes (e.g., gender). The primacy of relationships over attributes helped distinguish and progress social network research in supposed competition with traditional

sociological or psychological approaches. But for organizational network researchers, for whom the attributes of actors are often of great interest, this polarization seems strained.

From early on in organizational network research there has been a focus on attributes such as gender (e.g., Brass, 1985; Ibarra, 1992). Although centrality measures capture the relational aspects of actors' positions within the entire network, they function identically alongside attribute measures in regression analyses (e.g., Mehra, Kilduff, & Brass, 1998; Obstfeld, 2005). Such network measures resemble other individual attributes such as transient emotions and moods in being contingent on social context (e.g., Barsade, 2002). Further, social networks surrounding individuals have been characterized in attribute terms as "entrepreneurial" versus "clique" in order to explain individual outcomes such as early promotions (Burt, 1992: 158). Thus, to define organizational network research mainly or exclusively in terms of opposition to attribute-based approaches (e.g., Mayhew, 1980) restricts the scope of the research program in its specifically organizational instantiation. Attributes of organizations (e.g., size) and of individuals (e.g., personality) are increasingly studied within network based approaches in a challenge to the more doctrinaire versions of network research. (We review these debates below.) It is the complete set of core ideas at the heart of the organizational network research program that generates the program's distinctiveness rather than its adherence to Durkheimian or anti-attribute ideology. The organizational network research program progresses as attributes are combined with relationships to understand organizations.

### **Embeddedness**

The second core idea that gives organizational network research distinctiveness as a research program is the embeddedness principle understood within social network research as the extent to which economic transactions occur within the context of social relationships. Although

this principle was neglected by transaction cost economics (as pointed out by Granovetter, 1985), the effects of social relationships on economic outcomes are well understood by people working for tips (e.g., hairdressers and waiters) and parents of Girl Scouts trying to sell cookies. One clear articulation of the idea of embeddedness as it has emerged in organizational research was provided by Karl Polanyi (1944: 46): "... man's economy, as a rule, is submerged in his social relationships." Following from the discussion of embeddedness by Granovetter (1985), organizational network researchers generally assume that behavior, even buying and selling behavior, is embedded in networks of interpersonal relationships. Embeddedness is more important to the extent that markets are inefficient or when "economic exchange would be otherwise difficult" (Burt, 1992: 268), but even in relatively perfect markets people rely on social connections to make important decisions across a range of options (cf. Kilduff, 1990).

The idea of embeddedness has evolved to encompass the inertial tendency to repeat transactions over time. Actors are embedded within a network to the extent that they show a preference for repeat transactions with network members (Uzzi, 1996) and to the extent that social ties are forged, renewed, and even extended (cf. Gulati & Gargiulo, 1999) through the community rather than through actors outside the community. Embeddedness has "captured and fired the imagination of interorganizational researchers" in particular (Baker & Faulkner, 2002: 527). Thus, embeddedness involves the overlap between social ties and economic ties both within and between organizations (cf. Granovetter, 1985), an interpretation that has led to fundamental understandings concerning the governance of economic action in terms of trust and cohesion. Embeddedness can be seen as an organizing logic different from organizational hierarchy and market relations (Powell, 1990). The embeddedness principle is relevant to the

formation of industrial districts such as Silicon Valley (e.g., Saxenian, 1996) and to the structuring of strategic alliances (e.g., Gulati, 1998).

An early discussion of the embeddedness idea (Bott, 1957) showed that roles within marriage tended to be gender-segregated when the wife was embedded in a close-knit network of female neighbors and the husband was embedded in a close-knit network of male friends. Related research at the interpersonal level within organizations has drawn on the notion of Simmelian dyads (i.e., dyads that are embedded in triads) showing that such dyads are more stable over time (Krackhardt, 1998), exert more pressure on people to conform to norms (Krackhardt, 1999), and produce higher agreement concerning the culture of entrepreneurial firms (Krackhardt & Kilduff, 2002). Further, the concept of Bott-role segregation can be generalized from the context of husband/wife relations to analyze the effects of embeddedness on relationships and actor distinctiveness for organizations and individual persons (Burt, 1992: 255-260). And embeddedness can cross levels. For example, when the leader of Alpha organization becomes Beta organization's leader and transacts business with the Gamma organization, these transactions with Gamma are embedded within prior exchanges between the leader (who has now changed organizational affiliations) and Gamma (Barden & Mitchell, 2007).

A quite different approach to embeddedness (Provan & Sebastian, 1998) focused on clique overlap in examining whether the effectiveness of city mental health systems (in terms of client outcomes) depended on the extent of integration among small cliques of relevant agencies. Thus, the emphasis was not on the extent of exchange relations among all the housing, rehabilitation, criminal justice, and other agencies involved in mental health care in a particular city. Instead, the results showed that adults with severe mental illness tended to benefit to the

extent that they dealt with a small set of agencies that referred patients to each other and that also coordinated the care that patients received. An effective network was one that exhibited embeddedness in the sense that case coordination cliques overlapped referral cliques.

Another innovative embeddedness analysis found that high-growth entrepreneurial firms tended to form interfirm alliances through a process of interpersonal relationship development. As one vice president commented about his industry: "It is a very small community in which certain people have established credibility and reputation. The key is who you know" (Larson, 1983: 84). In the process of alliance formation, individuals who worked for different organizations became close to each other through day-to-day business interactions that involved risk-taking and trust. Written contracts, where they existed, were discounted in terms of their importance for alliance governance. Instead, economic exchange relations between firms were embedded in social relations of friendship and trust between people.

Of course, the embeddedness logic works only up to a point. A study of firms in the New York apparel industry showed that network structures that integrated arm's-length and embedded ties tended to optimize an organization's performance (Uzzi, 1996). "Embedded ties" were characterized by higher levels of trust, richer transfers of information and greater problem solving capabilities when compared to "arms-length" ties. A contractor's probability of failure decreased with first-order embeddedness (i.e., the extent to which the contractor concentrated its exchanges with a few trading partners rather than spreading out exchanges in small parcels among many partners). But the contractor's probability of failure also decreased to the extent that it maintained a moderate degree of second-order embeddedness (i.e., the extent to which the contractor firm's network partners maintained arm's-length or embedded ties with their network partners). Thus, the paradox of embeddedness (Uzzi, 1997) implies that firms not only have to

manage their relationships with their direct contacts, but they also have to accurately perceive and attempt to manage relationships among contacts of contacts.

As with all progressive research programs, leading ideas are generative of creative interpretations and definitions. Embeddedness, thus, has been extended to include the nesting of social ties within other social ties (multiplexity) (Kilduff & Tsai, 2003: 134) and to the appropriability of one type of tie by another (Coleman, 1990) -- for example, friendship ties being used to further business transactions (cf. Larson, 1992). The effects of both multiplexity and appropriability represent further frontiers for organizational social network research.

### **Structural patterning**

A third leading idea (related to but different from embeddedness) germane to the distinctiveness of the organizational social network research program is structural patterning. The network approach assumes that beneath the complexity of social relations there are enduring patterns of “connectivity and cleavage” (Wellman, 1988: 26) that, once revealed, can help explain outcomes at different levels. Important here is the focus not just on social ties between certain actors, but also the focus on the absence of ties between other actors. Structure is often defined in terms of groups of non-interacting actors. At the level of the whole social system, structural analysis can reveal such patterns of presence and absence. Overall system indicators of structure such as clustering, connectivity, and centralization can be precisely identified through such approaches as block model analysis (e.g., DiMaggio, 1986), core-periphery analysis (Van Rossem, 1996), and small world analysis (e.g., Kogut & Walker, 2001). These configurational approaches (analyzing patterns at the social network level rather than at the level of each individual's network of relationships) have been neglected in organizational research, although new interest in very large data sets (e.g., Uzzi & Spiro, 2005) may signal a surge of interest in

new configurational ideas and techniques borrowed from the physics of social networks (cf. Dorogovtsev & Mendes, 2003).

By addressing patterns of network structure, social network analysis permits the study of the whole and the parts of social networks simultaneously (Wellman, 1988). The parts of the network include dyads (two actors connected by a tie), triads (three actors and their ties), cliques (three or more actors all of whom are connected to each other), and larger structures such as components (in which all the actors can reach each other through social network ties -- cf. Powell, Koput, & Smith-Doerr, 1996). Researchers can in principle simultaneously address actor, group, and network characteristics. For example, a researcher might ask, to what extent does an actor's centrality within a highly central group in a decentralized network affect that actor's power? Although possible, such analyses have rarely been undertaken.

What has been studied in organizational research is the duality of social structure (Breiger, 1974), a concept that joins both micro and macro levels of analysis. Two people can be connected to each other through joint organizational affiliation (both people are on the board of Wal-Mart, for example); and two organizations can be connected to each other through people (both organizations have the same board member, for example). For a specific example of how the duality of social structure can be investigated, let's look at the data set collected by Galaskiewicz (1985) that details the links of 26 Minneapolis area chief executive officers to 15 clubs and corporate boards. Figure 2 uses a technique called correspondence analysis (Wasserman & Faust, 1994: 334-42) to model both the CEOs (indicated by "Rs") and the clubs and boards to which they belong (indicated by "Cs") in the same social space. In this instance, the analysis shows that a core set of CEOs tend to meet each other at a core set of clubs and

boards. The heart-shaped line in Figure 2 circles what appears to be the elite structure of business relationships in Minneapolis.

Thus, when two people interact, they may represent not only themselves, but also any formal or informal groups or organizations of which they are members (e.g., Galaskiewicz & Burt, 1991; Zaheer & Soda, 2009). Each person potentially represents a whole set of overlapping groups to which he or she belongs (Blau & Schwartz, 1984), these groups including not just formal affiliations to institutions such as sports clubs, but also ascribed affiliations to demographic categories such as gender and race. Organizations tend to be structured according to salient demographic faultlines that affect people's perceptions of outcomes such as team learning, psychological safety, and expected performance (Lau & Murnighan, 2005).

Faultlines separate demographic groups in organizations, with friendship networks tending to be denser among groups consisting of ethnic and gender minorities relative to groups consisting of ethnic and gender majorities (Mehra, Kilduff, & Brass, 1998). Density has a precise meaning in social network research, referring to the actual number of ties in the network divided by the maximum number of ties that are possible. Density represents one indicator of cohesion that can be compared across networks of the same or similar size. The denser the network, the more redundancy there is in terms of paths along which information and influence can flow between any two actors. Networks with high density tend to be ones in which norms concerning the proper way to behave are "clearer, more firmly held and easier to enforce" (Granovetter, 2005: 34). To the extent that density characterizes the "buy-in" network surrounding an individual who aspires to high office in a corporation, the individual is likely to have a clear understanding of what is expected from those who control the individual's fate (Podolny & Baron, 1997).

Although the structural perspective (with its focus on patterns of relationships) gives social network research part of its distinctive appeal, it is this aspect of network research that also tends to attract criticism (e.g., Kilduff & Tsai, 2003). Pure structural research tends to treat different kinds of relationships as more or less equivalent, because the focus is on structure rather than the content of ties. In searching for structure, different kinds of ties are often aggregated together (e.g., Burt, 1992), with the assumption being that the different structural patterns exhibited across the same set of actors are variations on the true underlying structure, or that one type of relationship can serve several different purposes. However, in the competitive evolution of the structural perspective, researchers have noted that different kinds of relationships can have different effects (e.g., Coleman, Katz, & Menzel, 1966; Podolny & Baron, 1997), especially if one considers negative ties (Labianca & Brass, 2006). Similar structural patterns may result in different outcomes when the content of the relationships is considered.

For example, if strong ties such as friendship are studied, then networks are likely to appear more dense than if weak ties such as acquaintanceship are studied (Granovetter, 1973; 1983). Tie strength is a function of time, intimacy, emotional intensity, and reciprocity. Strong-tie networks (at the interpersonal level) are likely to be dense networks because people who have friends in common tend to become friends themselves (Heider, 1958).

Of course, social networks can include several different types of ties, both strong and weak, and the particular combination of ties can result in a different depiction of the network. Novel information (such as the availability of jobs) tends to flow to people whose personal networks are structured to include weak ties that connect them to social circles within which neither they themselves nor their friends tend to move. Thus, "social structure can dominate motivation" (Granovetter, 2005: 34) in the sense that, although close friends may be more

interested than acquaintances in helping us, and strong ties may be necessary for the effective transfer of knowledge (Hansen, 1999), it is likely to be acquaintances who have more useful information concerning new jobs or scarce services (Granovetter, 1982).

When examining networks of both strong and weak ties, one is likely to see clusters of strong-tie actors, with the clusters connected to each other mainly by means of weak ties, a community structure of clustering and connectivity that is likely to be better able to organize itself against attack than a community structure that consists of isolated cliques (Granovetter, 1973). Thus, one of the paradoxes of the structural patterning of social life, that follows from the strength-of-weak-ties argument (Granovetter, 1973), is that individuals may be densely connected to others within clusters despite little connection across clusters. A particular social world may be fragmented into groups consisting of people similar on some attribute (such as ethnicity), with little or no contact across groups. Such a social world, which exhibits a lack of organization across clusters, may be quite fragile despite each person within the social world experiencing tight, within-cluster cohesion (Granovetter, 1973).

Fault lines between different clusters tend to emerge over time either through default processes such as a preference for interaction with similar others (i.e., homophily: Mehra, Kilduff & Brass, 1998), through processes of active recruitment of friends and kin that can occur beneath the radar of management attention (e.g., Burt & Ronchi, 1990), or with the active encouragement of management (e.g., Seidel, Polzer & Stewart, 2000). The theme of networks resilient against or subject to breakdown and attack has emerged as a major research area for those studying small world networks (e.g., Dorogovtsev & Mendes, 2003).

### **Utility of social network connections**

The fourth leading idea from which social network research draws its distinctive program is the belief that social networks provide the opportunities and constraints that affect outcomes of importance to individuals and groups.<sup>1</sup> Researchers are not content with merely describing social relations, embeddedness, and social structure, but increasingly focus on whether differences in patterns of social interaction matter for individual actors and communities. The answer is yes -- social interaction does matter. Researchers have found that the types of networks we form around us affect a range of outcomes including life expectancy (Berkman & Syme, 1979) and susceptibility to infection (Cohen et al., 1997), as well as organizational outcomes such as performance (Mehra, Kilduff, & Brass, 2001), promotions (Brass, 1984; Burt, 1992), and firm innovation (Ahuja, 2000).

A major theoretical impetus has come from the structural-hole perspective (Burt, 1992). We choose to focus on this perspective's relevance for the utility of network connections rather than on its undoubted importance for understanding structural patterning because of the strong emphasis within structural-hole theory on outcomes. Structural-hole theory compares two different types of networks surrounding the focal actor -- one involving holes (and casting the central actor as a broker between contacts who are themselves not connected, hence the "holes"); and one involving closure (and casting the central actor as an integral member of a densely connected team, hence the "closure"). For example, in Figure 1, Jen's connections span across structural holes (e.g., between people who themselves are not connected and who are from different ethnic groups such as Alan and Mark; and Pam and Fay) whereas Bill's connections constrain him within a densely connected team of people from the same ethnic group. The theory posits that actors with closed networks (in which ego's trusted contacts are said to be "redundant"

with each other) are disadvantaged in terms of information and control benefits relative to actors whose networks are “rich in structural holes” (Burt, 1992: 47).

A contrasting perspective focuses not on the individual actor but on the collectivity and assesses how groups of actors collectively build relationships that provide benefits to the group (e.g., Coleman, 1990). From this perspective, the emphasis is on norms, trust, and reciprocity that result from network closure within communities. In the US, statistics show a steady decline in membership in bowling leagues, bridge clubs, and community and church groups since the 1950s, all symptomatic of a more individualistic and less communal society (Putnam, 1995). This decline in membership in crosscutting social groups affects not only the collectivity, but also individuals who may find themselves trapped in their own nets (Gargiulo & Benassi, 2000) with no weak links or other connections to outside groups (Granovetter, 1973), but with many "redundant" ties to people who are connected to each other.

The redundancy idea is important for understanding the structural hole approach to network connection utility. Initially, redundancy was defined as the extent to which two contacts “provide the same information benefits to the player” (Burt, 1992: 47) -- this is less a network explanation than a contextual one, surely requiring more information about the contacts. It is conceivable that ego might have two trusted contacts who, despite being connected to each other, nevertheless provide quite disparate information to ego. However, there are network indicators of redundancy. Burt pointed out in his original formulation that “contacts who, regardless of their relationship with one another, link the player to the same third parties have the same sources of information, and so provide redundant benefit to the player” (Burt, 1992: 47).

From this explanation, the argument seems to point to brokerage opportunities that are at some distance from the broker -- to the importance of what Burt (1992: 39-40) has called

"secondary structural holes." A primary structural hole opportunity is offered to you when two of your acquaintances are themselves not acquainted (e.g., in Figure 1, Jen spans the structural hole between Alan and Mark). A secondary structural hole opportunity is offered to you when, in considering your relationship with A, you notice that B offers similar access to the network of ties you are interested in, and that, therefore, you could substitute B for A. Thus, in Figure 1, Jen has a reciprocated tie to Fay, but Jen could, according to this secondary hole logic, cut her tie to Sue given that Sue offers much the same access to others that Fay does, and given that Fay does not reciprocate the friendship tie from Sue. According to structural-hole logic, you can play A off against B to achieve a better return from your investment of time and resources in the relationship.

If ego has access to secondary structural holes, this means that the direct contacts of ego face competition within their own networks for ego's favors. There is evidence that dyadic relationships that reach into secondary structural holes experience ease of knowledge transfer, but, interestingly, the same evidence shows that dyadic relationships that reach into cohesive network structures also experience ease of knowledge transfer (Reagans & McEvily, 2003). The importance of secondary structural holes has been questioned in recent arguments and empirical research (Burt, 2007), an issue we take up later when we discuss boundary specification and direct versus indirect ties.

The other part of the structural-hole argument relates not to whether brokerage opportunities should be assessed proximately or distantly but to the comparison with "closed" (i.e., cohesive) networks. The case for network closure at the individual, ego-network level, builds from the idea that location within a connected group (e.g., the group of people around Bill in Figure 1) helps forge a sense of personal belonging and also creates a normative framework

within which the individual's social identity emerges and is reinforced (Coleman, 1990). With respect to getting ahead in organizations the argument goes as follows: “A cohesive network conveys a clear normative order within which the individual can optimize performance, whereas a diverse, disconnected network exposes the individual to conflicting preferences and allegiances within which it is much harder to optimize” (Podolny & Baron, 1997: 676).

A question for future research concerns the conditions under which either cohesive networks or structural-hole networks are likely to provide the focal actor with advantages. Some evidence suggests that the benefits of cohesion flow mainly to people occupying lower hierarchical levels in organizations (Podolny & Baron, 1997;) whereas the benefits of structural holes flow mainly to members of senior management (Burt, 1997), for whom “issues of organizational identity and belonging may no longer be salient for career advancement” (Podolny & Baron, 1997: 689). Other research showed that non-supervisory employees who spanned across structural holes in workflow and communication networks were indeed influential and likely to get promoted (Brass, 1984), regardless of gender (Brass, 1985). Career benefits have been shown to be associated with structural hole spanning across a wide range of hierarchical levels (Seibert, Kramer, & Liden, 2001). Recent work that included a sample of executives showed that the purported information advantages of spanning structural holes came at the cost of overestimating the extent to which others in the workplace agreed with ego concerning ethical issues (Flynn & Wiltermuth, in press).

Another question for future research concerns the specific resources that are assumed to flow through social networks to the benefit of brokers or others. The advantages to an actor of occupying a structural hole may come from the flow of power (playing one actor off against another), from the flow of information (acquiring non-redundant information from alters), or

from the flow of referrals from grateful alters (subsequent to the closing of the hole). Closed networks are assumed to engender shared norms and trust, but seldom are these flows of communal feeling measured or tested. As the social network research program moves forward, we are likely to see more attention to the resources moving through the pipes and prisms (cf. Podolny, 2001) of the network.

Disconnected networks help brokers realize value by offering these brokers the opportunity to transfer ideas from one isolated group to another, a process that involves recognizing when solutions current in one part of the network are likely to have applications elsewhere in the network (Hargadon & Sutton, 1997). But organizations in rapidly developing fields are likely to benefit from the transfer of emergent complex knowledge to the extent that (rather than depending on brokers) they themselves are part of the alliance network of industry collaborations (Powell, Koput, & Smith-Doerr, 1996). In cases where front-line employees must be mobilized or coordinated around complex or innovative projects, a cohesive network in which people are brought together to implement ideas may be more functional than a dispersed network in which disconnected people provide ideas through brokers (Obstfeld, 2005).

A recent comprehensive meta-analysis at both the individual person level and at the firm level showed that whether the dependent variable was performance or innovation, spanning structural holes was advantageous for the central actor (Balkundi, Wang, & Harrison, 2009). Similarly, a review of the literature concerning individual performance, promotions, and career advancement, concluded that there was overwhelming support for the benefits of structural holes (Brass, 2010), despite isolated studies showing contingency effects for gender (Burt 1992), hierarchy (Burt 1997), and cooperative culture (Lazega, 2001; Xiao & Tsui, 2007). Overall, then, evidence suggests that networks featuring structural holes offer opportunities for non-redundant

information and competitive brokerage, whereas cohesive networks offer opportunities for collaboration, innovation implementation, and the learning of complex knowledge.

The structural hole vs. closure debate has generated considerable research and further refinement and it is easy to overlook a basic theoretical agreement of both approaches. Both suggest that densely connected networks are constraining. In the case of closure, constraint is a good thing: it facilitates the monitoring and enforcement of norms that generate identity and trust. From a structural hole perspective, constraint is a bad thing: it limits the input of novel information and the ability to broker relationships. Future debate and research might fruitfully focus on identifying both the positive and negative utilities of particular network connections as well as contingent utilities.

Relationships, embeddedness, structure and social utility are core ideas that have vaulted organizational social network research to its current popularity. The ideas overlap: relationships are embedded in structures that obtain utility. And, separately, each has overlaps with other traditional approaches. But, taken together they provide a distinctive niche for organizational social network research. These leading social network ideas have evolved through challenges to and competition with the leading ideas of other established approaches in social science and management (cf. Lakatos, 1970). Network leading ideas will continue to be challenged, shaped, and developed by criticisms and controversies. Having set the groundwork, we now turn our attention to competitive debates that propel the research program forward.

### **Criticisms and Controversies**

#### **Actor characteristics**

Network research, especially research from a sociological perspective, has tended to pursue a Durkheimian agenda (Emirbayer & Goodwin, 1994) focused on emergent social

structure irreducible to any individual attribute (e.g., Mark, 1998; Mayhew, 1980). The characteristics of individual actors, to the extent that they are discussed at all, have tended to be treated as residues of social structure. From this perspective, for example, people who are constrained within relatively closed networks develop different personalities from those who experience relatively open networks (Burt, 1992). Challenges to this structuralist perspective have come from personality psychology (with respect to the networks developed by people) and from strategic choice researchers (with respect to the networks developed by organizations).

Of particular interest for interpersonal networks is the self-monitoring personality variable that has provided suggestive evidence that people with different self-monitoring orientations tend to occupy different structural positions (Kilduff, 1992; Kilduff & Krackhardt, 2008; Mehra, Kilduff, & Brass, 2001). Self-monitoring theory focuses on the monitoring and control of expressive behavior (Snyder, 1974). High self-monitors strive to orient their attitudes and behaviors to the expectations of specific audiences in social situations, whereas low self-monitors strive to orient their attitudes and behaviors to inner affective states (Day & Kilduff, 2003; Snyder, 1979).

Thus, self-monitoring helps explain why some individuals tend to occupy structural holes. Because of their self-monitoring orientation, some people inhabit partitioned social worlds (in which ego's contacts are themselves disconnected from each other) whereas other people inhabit closed social worlds (in which ego's contacts are connected to each other). This partitioning-versus-closed-social-worlds hypothesis was tested on a sample of Korean expatriate small business owners in North America (Oh & Kilduff, 2008). The results suggested a ripple effect of personality on social structure whereby high self-monitors, relative to low self-monitors, ingratiated themselves into distinctly different social circles of acquaintances with few

links between these clusters, such that the acquaintances of their acquaintances tended to be unacquainted with each other.

Given this burgeoning work on self-monitoring and networks, some people fear the opening of a Pandora's box of individual differences, a cascade of hundreds of personality variables clamoring for attention as explanations of why some people occupy certain network positions. The evidence from self-monitoring research, however, suggests that strong guiding theory is needed if even a single personality variable is to have any chance of predicting significant variance in network outcomes. For example, one rigorous and ambitious attempt examined whether the five-factor model of personality (typically considered to comprise a comprehensive set of standard personality variables) related to network centrality, and found that all the variables together within this model explained only two percent of the variance in advice and friendship centrality (Klein, Lim, Saltz, & Mayer, 2004).

In earlier work concerning job attainment and promotions, there was an interest in demographic and status-based individual differences. Research investigated these differences for both the focal individual and his or her contacts. Thus, we know that weak ties enable people to reach higher status alters and that alters' occupational prestige is one key to ego obtaining a high status job (Lin, Ensel, & Vaughn, 1981; Lin, 1999). Future research on personality and social networks might consider following this example -- by, for example, including alters' personalities in the research design.

At the organizational level also, a debate has emerged concerning the importance of actor in a characteristics in social networks.<sup>2</sup> Strategy research traditionally has focused on identifying firm-specific characteristics that contribute to organizational competitive advantage (cf. Rumelt, Schendel, & Teece, 1994). Indeed, the antecedents and consequences of

organizational differences contribute to the foundations of the resource-based view of the firm (Barney, 1991). Thus, the structuralist focus on relations to the exclusion of actor characteristics strikes network-trained strategy researchers as unsatisfactory, paralleling the dissatisfaction with the structuralist approach experienced by many people working at the level of interpersonal networks. Standard social network views and resource-based views of the firm have been reconciled in one recent model that integrates these contrasting perspectives within a relational view of competitive advantage (Lavie, 2006). The message from this model is that properties of actors matter for the ability of firms to extract value from their network relationships.

Recent empirical work builds on these ideas to understand the role that firm characteristics play in how firms extract performance benefits from their structural positions. Important properties of the firm to consider include absorptive capacity, bargaining power, and ability to check partners' non-cooperativeness (Shipilov, 2006; 2009). Extending beyond the firm level, other work examines the alliance portfolio, which can be defined as the collection of direct ties between a firm and its partners (Hoffman, 2007; Lavie, 2007; Lavie & Miller, 2008). In this perspective, it is not only the size of a firm's network of direct ties that is important (i.e., the ego network), but also the properties of all firms in the network. This portfolio approach mirrors the prior focus on the status of alters at the interpersonal level (Lin, 1999). To understand how a firm can benefit from its network relationships, it is necessary to take into account such characteristics of partner firms as: their performance, their relative power over the focal firm, and the extent of their internationalization. The argument here is that higher complementarities between the focal firm and its alliance portfolio partners lead to increases in the value generated across the portfolio of firms, whereas higher competition within the portfolio of firms (indicated,

for example, by the prevalence of substitute partners) enables the focal firm to extract value from its portfolio.

At an even higher level of aggregation, the emerging literature on small worlds (e.g., Watts, 1999) has tended to identify similarities in the behaviors of complex systems irrespective of the membership of those systems, and irrespective of nodal properties. Thus, the mechanisms explaining the phenomena of complex systems have tended to be similar whether the systems are based on the collaboration of individuals (e.g., Uzzi & Spiro, 2005) or organizations (e.g., Baum et al., 2003; Kogut & Walker, 2001). The attributes and behaviors of actors tend to be discounted in favor of an emphasis on how system structure changes and self-perpetuates. There has been a recent trend, however, toward the recognition of individual action in shaping higher-level outcomes. Thus, recent research examines how the behavior of individuals in terms of their preferences for partnering with actors at the core of their networks and their preferences for forming repeated relationships shape macro network characteristics such as small worldliness (Uzzi et al., 2009).

The focus on structural patterns to the exclusion of actor attributes helped social network research establish a distinctive niche for itself. But recent work has challenged this ideological refusal to consider ways in which individual actors differ in their attributes. Theory that links individual attributes to structural outcomes is likely to be generative of compelling research. Such research might fruitfully include the characteristics of all members of the network in order to explore the possibility of complementary synergies between actors and network structure.

### **Agency**

Perhaps the most frequent criticism of social network research is that it fails to take into account human agency (e.g., Salancik, 1995). As one critique noted, network research fails to

show how "intentional, creative human action serves in part to constitute those very social networks that so powerfully constrain actors in turn" (Emirbayer & Goodwin, 1994: 1413). Actors (individual people or organizational entities) are assumed to have the abilities, skills, and motivation to take advantage of advantageous network positions. Disadvantageously placed actors are similarly assumed to lack the skills, abilities and motivation to overcome the constraints upon them. Clearly, this perspective represents a type of structural determinism. The network surrounding the individual is taken to simultaneously indicate "entrepreneurial opportunity and motivation" (Burt, 1992: 35). The overly-formalist nature of much network research has been criticized as failing to "offer a plausible model of individual action" (Friedman & McAdam, 1992: 160).

As social network research has moved forward, it has typically adopted this sociological perspective whether focusing on macro or micro level determinants and outcomes. Indeed, organizational network research was for decades focused on interlocking directorates (e.g., Burt, 1980; 1983; Mizuchi, 1996; Palmer, 1983; Palmer, Friedland, & Singh, 1986) with a later focus on strategic alliance networks (e.g., Gulati, 1998; Gulati, Nohria, & Zaheer, 2000). Even early micro studies focused on "being in the right place" (Brass, 1984) with few attempts to account for behavioral strategies (see Brass & Burkhardt, 1993, for an exception) or psychological processes (see Krackhardt & Porter, 1986, for an exception). The emphasis has been on how macro social conditions affect macro level outcomes or on how micro factors affect micro level outcomes (Coleman, 1990: 8). The macro-micro links between organizations and the individual people in those organizations have been neglected. The assumption has been that we can say little or nothing to elucidate the different psychological preferences or orientations of actors (as we have discussed in the prior section concerning actor characteristics). This sentiment was

summed up in the title of a famous article in economics: "De gustibus non est disputandum," that can be translated as "there is no accounting for taste" (Stigler & Becker, 1977).

Although this determinist emphasis continues in organizational network research, there is evidence of an agentic turn (e.g., Stevenson & Greenberg, 2000) even among the more sociologically-inclined network scholars (e.g., Burt, 2007; DiMaggio, 1997; Podolny, 1998; Zuckerman, 1999). Social network research in organizational contexts has acknowledged that individual action shapes and reproduces social structures of constraint (e.g., Barley, 1990), and that, in principle, some philanthropic individuals can choose not to reap the profits derived from their network (Burt, 1992: 34-35). However, despite the agentic turn, there has been a relative lack of research concerning how individuals make choices concerning the social networks that facilitate and constrain their actions. Critics have called for richer psychological theory to supplement the overreliance on rational choice models of individual behavior in social network research (Kanazawa, 2001).

We should recognize here, following on the discussion from the prior section, that as individual actors pursue advantages through their portfolios of social network connections, the networks of ties within which they are embedded are themselves evolving as the result of multi-actor behaviors. Thus, if a particular actor tries to maintain disconnections among other actors in order to gain structural-hole advantages, these other actors may themselves form an alliance in order to resist the manipulations of the focal actor. There has been little research on these evolving scenarios, but we do know that, in competitive arenas, structural hole opportunities tend to disappear relatively fast (Burt, 2002).

Compared to the structural hole vs. closure debate or the structure vs. actor characteristics debate, the agency vs. structure debate has yet to demonstrate a driving force in developing

social network research. The focus on actor characteristics provides some overlap given that personality and firm characteristics relate to behavior and strategy. In addition, the recent debate over indirect ties (see boundary specification below) may focus attention on agency. Future research might consider more closely the question of how much control actors have over the networks that constrain and enable their behaviors.

### **Cognition**

One area that has drawn from the core concepts of social network research to bridge the micro-macro gap has been cognitive social network research. Sociological research has tended to neglect the subjective meanings inherent in networks in favor of an emphasis on supposedly "concrete" relations such as exchanges between actors (Emirbayer & Goodwin, 1994: 1427). Management research from the micro perspective has tended to be less ideologically constrained in its consideration of a range of perceived and actual network relations.

Indeed, some early work suggesting that an organization could be considered a network of cognitions (e.g., Bougon, Weick, & Binkhorst, 1977) looks prescient in anticipating the growing attention to how perceptions of networks are themselves constitutive of action (e.g., Burt, 1982). But a focus on cognition and networks has been present in micro social network research for a long time. Field theory as developed by Kurt Lewin in the 1940s featured an emphasis on the network of cognitions by which individuals negotiated social spaces (Lewin, 1951). And the work of Fritz Heider (1958) on balance theory established the importance of understanding how expectations affect network perceptions.

From a balance theory perspective, people expect their own friendship relations to exhibit reciprocity (the people they like will reciprocate liking) and transitivity (if they like two people then those two people will like each other). Paralleling the work of Heider (1958), De Soto

(1960) found that network structures representing balance and transitivity were easier for subjects to learn. A more recent study (Krackhardt & Kilduff, 1999) showed that individuals tend to perceive friendship relations in organizations as balanced both close to the individual and far away. Individuals suffer emotional tension if the people they extend the hand of friendship to fail to reciprocate their liking or fail to like each other (cf. Heider, 1958). As the individual looks across the organization at the friendship relations among people who are relative strangers to the individual, then the individual is likely to compensate for lack of knowledge concerning the relationships among the strangers by filling in the blanks according to a balance schema so that the stranger friendship relations are perceived to be reciprocated and transitive (cf. Freeman, 1992).

In addition, we know that people in organizations tend to perceive themselves as more central in their friendship networks at work than they really are (Kumbasar, Romney, & Batchelder, 1994); that they tend to misremember who attended any particular meeting, recalling the meeting as attended by the regular members of their social group and forgetting the casual attendees (Freeman, Romney, Freeman, 1987); and that default cognitive expectations about networks (such as the expectation that relations will be transitive) can be challenged and updated by experience with contrasting social network structures (such as the absence of transitivity and the presence of structural holes) (Janicik & Larrick, 2005).

But does any of this matter? Evidence suggests that it does. Accurate perceptions themselves turn out to be important: those who more accurately perceive who is connected to whom in the advice network are rated as more powerful by others in the organization (Krackhardt, 1990). In addition, people evaluate others based on their perceptions of connections in the network. An individual's reputation as a high performer in an organization is

significantly affected by whether others in the organization perceive the individual to have a high-status friend, irrespective of whether the individual actually has such a friend (Kilduff & Krackhardt, 1994). You are known by the company you keep. But, cognitive interpretations are not only made by third party observers, relationships also hinge on the cognitive interpretations of actions by the parties involved. For example, we are not likely to form relationships with people whom we perceive as trying to use us. Calculated self-interest in building relationships, if perceived, is self defeating. Overall, the cognitive social network research has led to the view of networks as “prisms” through which others' reputations and potentials are viewed; as well as “pipes” through which resources flow (Podolny, 2001).

Recent cognitive research shows that individuals tended to bias perceptions to accentuate small-world features of clustering and connectivity (Kilduff, Crossland, Tsai, & Krackhardt, 2008): across four different organizational friendship networks, people perceived more small worldness than was actually the case, including the perception of more network clustering than actually existed, and the attribution of more popularity and brokerage to the perceived-popular than to the actually-popular. Although small-world research has offered the hope of a connected world (Watts, 2003) and countered the fear that each of us lives in increasing isolation from others (cf. Putnam, 2000), this cognitive perspective on small worlds suggests that clustering and connectivity may be more prevalent in people's cognitions than in reality. Linking with others distant from ourselves may require far more effort than we have believed.

In this connection, emergent research at the macro level of organizational networks (Shipilov, Li, & Greve, 2009) links the structural positions of firms to how these firms conceptualize their environments and set cognitive reference groups. Organizations that act as brokers tend to compare themselves to other broker-type organizations, whereas non-broker

organizations tend to compare themselves to their fellow clique members. Non-broker firms (in contrast to broker firms) tend to depart from the comfort of attaching themselves to similar others in response to discrepancies between actual and historic performance aspirations. Thus, the cognitive turn in social network research has implications at the level of strategic social network interaction (see also Baum, Rowley, Shipilov, & Chuang, 2005).

Just as actor characteristics may reflect capability, and agency may reflect motivation, cognition may assess awareness of network opportunities and constraints. All three (actor characteristics, agency, and cognition) may be necessary components of the utility of social connections. Inclusion of all three components may provide additional insights and leading ideas in social network research.

### **Cooperation vs. competition**

Social network research has been criticized not only for neglecting agency and individual psychology, but also for neglecting the context within which networks emerge and constrain action (Emirbayer & Goodwin, 1994). Although seldom acknowledged (see Xiao & Tsui, 2007, for an exception), the issue of cooperative versus competitive culture permeates social network analysis, and has surfaced in one of its most vigorous debates.

The controversy concerning structural equivalence versus cohesion provides an illustration of the importance of cultural context concerning one of the key developments in the modern history of social network analysis (White, Boorman & Breiger, 1976). According to structural equivalence logic, the influence process from one actor to another involves competition between rivals for the same network position. Structurally equivalent actors connect to the same set of other actors, and are, in this sense, jockeying for the same social role, much like siblings in a family or rival organizations vying for the same market. Unlike siblings,

however, two actors can be structurally equivalent (i.e., have the same or nearly the same connections to the other actors in the network) even though there is no direct connection between the two actors themselves. From a structural-equivalence perspective, communication between the two can be entirely cognitive and symbolic: structurally equivalent actors are hypothesized to “put themselves in one another’s roles as they form an opinion” (Burt, 1983: 272). To understand whether and how much two actors are likely to exert influence on each other, therefore, the researcher must understand the extent to which the pair share the same ties with others in the social network.

In contrast to structural equivalence, the *cohesion* perspective emphasizes that individuals trying to decide among important and risky alternatives are likely to consult with each other, relying on friends and colleagues for advice (Coleman, Katz & Menzel, 1966). Thus, influence from the cohesion perspective flows across direct ties among actors within a network of cooperation. Much like a contagious virus, the diffusion of information or influence occurs through direct contact. Structural equivalence, on the other hand, presents a diffusion option that requires only a cognitive awareness of others.

The debate between the structural equivalence and cohesion views was catapulted into prominence by the claim that cohesion as an explanation for social influence was an “obvious failure” (Burt, 1987: 1328). The reanalysis of an influential cohesion study (Coleman, Katz & Menzel, 1966) showed “strong, stable predictions” from a structural equivalence perspective whereas cohesion yielded “predictions that are near random in the aggregate and systematically biased in certain social structural conditions” (Burt, 1987: 1328). Instead of a cohesion story of how physicians (in deciding whether to prescribe a new antibiotic to patients) tended to be influenced by colleagues, friends, and discussion partners, the structural equivalence model

highlighted “competition between ego and alter” (Burt, 1987: 1291). If two actors had “identical relations with all other individuals in the study population” they could be assumed to be “fighting one another for survival” or at least competing with one another to “evaluate their relative adequacy” (Burt, 1987: 1291).

Three major re-analyses of Burt’s (1987) reanalysis of the original data followed (see Kilduff & Oh, 2006, for a critical review). The re-analyses focused on data and statistics (Mardsen & Podolny, 1990; Strang & Tuma, 1993) and pharmaceutical marketing (Van den Bulte & Lilien, 2001). More recently, a fourth study (Van den Bulte & Joshi, 2007) has found support for the original (Coleman et al., 1966). After 40 years of conflicting findings, the question remains as to whether the physicians were experiencing a competitive or a cooperative culture. Likewise, the benefits of both structural holes and closure may depend on the degree of cultural cooperation vs. competition.

We can, perhaps, conclude that data abstracted from context are variously interpretable (Galaskiewicz, 2007). Thus, social network analysis should be rooted in the specifics of time and place (Kilduff & Oh, 2006) to avoid abstracted empiricism in which methods determine problems (Mills, 1959: 57). In terms of the debate between structural equivalence and cohesion, the argument is no longer over which perspective is right or wrong, but which *measure* is most appropriate given the particular context being studied, particularly because other viewpoints have articulated distinctly different ideas concerning social influence (e.g., Sparrowe & Liden, 2005: 518).

The controversy over a competition-based view of social interaction and a cooperative-based view reoccurs throughout the social network literature on organizations. As one commentator pointed out: “the language of structural holes theory is often the language of

competition, control, relative advantage, and manipulation” (Obstfeld, 2005: 120). Similarly, social capital has been understood, for individual actors, as the economic returns resulting from strategic exploitation of network positions (Burt, 2000). In contrast, the language of closure has been one of trust, norms, and reciprocity, and the civic spirit that promotes the economic well-being of the community (Coleman, 1990; Portes, 2000; Putnam, 1995). One approach to the controversy brings together both closure and structural holes in one analysis and demonstrates that their effects can be complementary (Oh, Chung, & Labianca, 2004; Reagans, Zuckerman, & McEvily, 2004). Similarly, a meta-analysis at the team level showed that density within teams and team centrality in intergroup networks related to performance (Balkundi & Harrison, 2006). Cooperation and competition are likely to continue as resilient themes in network research concerning individuals, teams, and organizations. But, explicit consideration of competitive and cooperative culture may be necessary to fully understand the relative advantages of various network structures.

### **Boundary specification**

Given the importance of embeddedness as a leading idea in network theory and research, the question arises whether we are to take into account only ego's embeddedness within the network of those to whom ego is tied directly, or whether we should also include the contacts of ego's contacts -- an issue that was raised by Granovetter (1973: 1370) in his foundational article. Since Granovetter drew attention to this issue, the emphasis has been on ways in which social resources are affected by the number of direct and indirect ties (Lin, 1999: 470). In terms of job search, for example, some evidence suggests that “job seekers tend to find better jobs if they use an indirect tie [i.e., make use of a go-between] than if they use a direct tie” (Bian, 1997: 372). Further, analyses show that, in the case of venture capitalists considering investing in new

ventures, it is indirect rather than direct ties that are significant: referrals through indirect ties rather than information directly from applicants influenced investment decisions (in cases where public information was not freely available) (Shane & Cable, 2002). Other research has demonstrated the effects of such two-step ties on managing resource dependence (Gargiulo, 1993), perceiving conflict (Labianca, Brass, & Gray, 1998), influence (Sparrowe & Liden, 2005) and exhibiting organizational citizenship behavior (Bowler & Brass, 2006).

In a very different set of contexts, longitudinal research demonstrated significant effects of direct and indirect ties on obesity (Christakis & Fowler, 2007), smoking cessation (Christakis & Fowler, 2008) and happiness (Fowler & Christakis, 2008). For example, the happiness study showed that a person's happiness was associated with the happiness of people (friends or family members) up to three degrees removed from them in the network (Fowler & Christakis, 2008). The effect of indirect ties showed up also in centrality analyses that took into account the centrality of the actors to whom the focal actor was connected. Controlling for age, education, and the total number of family and non-family alters, the results showed that the better connected ego's friends and family, the more likely ego was to attain happiness in the future. But, happiness itself did not increase ego's future centrality (Fowler & Christakis, 2008).

The precise ways in which emotions traverse through indirect ties to affect the emotional state of an individual far removed in a social network remain to be discovered. Indeed, the debate over the relative importance of direct and indirect channels of influence and support is just getting underway, as witnessed by recent work compatible with the view that returns to brokerage derive overwhelmingly not from indirect ties but from ego's direct contacts (Burt, 2007). This debate concerning direct and indirect ties is important because whereas individuals have some control over who to involve in their circles of friendship and acquaintanceship, they

have less control over the network associations formed by these friends and acquaintances. And, even in relatively small organizational contexts there are difficulties in accurately perceiving the pathways of ties that connect us to distant alters (Krackhardt & Kilduff, 1999). If indirect ties have significant consequences for individuals, this lends support to a deterministic view of how networks affect individuals' outcomes.

The question is one of boundary specification -- deciding on how many links to include in extending the network beyond ego's direct ties. Typically, all actors in a particular formal group (such as a work group, department, or industry) are included without thinking through the implications of this default boundary. But research shows that ego's centrality within a department can be positively related to power and promotions whereas ego's centrality within the entire organization can be negatively related to power and promotions (Brass, 1984). In addition, experimental studies of exchange networks have shown that an actor's structural-hole power to negotiate (play one alter off against the other) is significantly weakened if the two alters each have an additional link to an alternative negotiating partner (Cook, Emerson, Gilmore, & Yamagishi, 1983). In sum, there is considerable evidence for both the local and the more extended network approach. Including the appropriate number of links is likely a function of the research question and the mechanism involved in the flow. Yet, explicit consideration and justification of the boundary specification is currently missing in most organizational network research.

Equally debatable is the boundary specification problem of determining the appropriate number of different types of networks (network content) to include. From a purely structural perspective, a link is a link is a link. As we mentioned in our discussion of the core idea of structural patterning, there has been criticism of the structural approach for focusing on form

over content (Stokman, 2004). On the one hand, interpersonal ties often tend to overlap and it is difficult to separate ties on the basis of content. In addition, one type of tie may be appropriated for a different type of use -- a friendship tie might be used to secure a financial loan, or sell Girl Scout cookies. The obvious exception to appropriability is negative ties – when one person dislikes another (Labianca & Brass, 2006). Centrality in a conflict network will certainly have different antecedents and outcomes than centrality in a friendship network (cf. Klein et al., 2004).

The emerging debate concerning the importance of indirect ties and different kinds of ties offers the prospect of a significant extension of the network research program. Does the importance of relations imply that different types of relations are of differential importance or do they need to be aggregated to provide a complete picture of the appropriability of relations? Does embeddedness extend beyond the immediate local contacts in the network? If indirect ties are important, does this importance provide a structural justification for ignoring agency and actor characteristics? Is the utility of social connections dependent on indirect ties and the content of ties? Research addressing these questions is likely to drive the program forward.

### **Discussion**

A progressive research program draws new theory and innovative hypotheses from its core ideas, alerting researchers to new types of phenomena, and pushing the boundary of exploration and discovery (Lakatos, 1970). However, the progress to a fully-fledged independent research program is a long one. Within the field of organizational social networks, theory has long been borrowed and adapted from other disciplines including mathematics (e.g., graph theory) and social psychology (e.g., balance theory, social comparison theory). Homegrown theories, developed within the social network research tradition, have included the strength of

weak ties (Granovetter, 1973) and structural holes (Burt, 1992). There have also been innovative syntheses between the organizational social network research program and organization theories including contingency theory (e.g., Barley, 1990; Hansen, 1999), resource dependence ideas concerning organizational reliance on a pattern of interconnectedness among organizations (e.g., Powell, Koput, & Smith-Doerr, 1996), and population ecology ideas concerning interactions within and among organizational populations (e.g., Baum & Singh, 1994). At the micro level, we have seen the social network approach combined with social information processing (Rice & Aydin, 1991), social exchange (Cook, 1982), and cognitive dissonance (Krackhardt & Porter, 1986). More recently, we have seen a revival of innovative social network theory concerning small worlds applied to systems of organizations (e.g., Kogut & Walker, 2001) and systems of organizational cognition (Kilduff, Crossland, Tsai, & Krackhardt, 2008).

This wealth of theoretical activity shows the social network research program continuing to draw inspiration from the core ideas of social relations, embeddedness, structural patterning, and social utility. However, there is also evidence of a renewed emphasis on description and analysis of social networks in the absence of theory. In part this is fueled by interest in huge network data sets concerning, for example, mobile phone traffic (Eagle & Pentland, 2006) and electronic commerce (e.g., Wasko, Teigland, & Faraj, 2009). And in part it is fueled by a more general impatience with the ever-increasing demand for new theory characteristic of our top journals (see, in particular, the polemic by Hambrick, 2007, against theory).

A retreat into description and analysis in the absence of new theory would signal a setback for the organizational social network research program, a setback that this article has striven to prevent. (See the critique of atheoretical social network research by Granovetter, 1979; and Galaskiewicz, 2007.) Certainly, in looking at the current state of the research program, we

recognize that it encompasses a great number of topics at different levels of analysis, making it difficult to see the coherence within the diversity. One of the aims of this article has been to identify core ideas that represent the basis from which such diverse research proceeds in the articulation of new theory and the identification of new phenomena; and to review currently lively controversies with respect to actor characteristics, human agency, cognition, cooperation versus competition, and boundary specification. Such debates will contribute to the further articulation of social network leading ideas.

We have said little about some of the critiques that have afflicted social network research in the past. For example, one previous standard criticisms of the social network research program was its neglect of network change (e.g., Emirbayer & Goodwin, 1994: 1413). One of the signs that the social network research program is in a progressive phase in which it tackles new phenomena using new tools is the burgeoning of work concerning network change, particularly at the interorganizational level using archival alliance network data (e.g., Gulati, 2007; Gulati & Garguilo, 1999; Soda, Usai, & Zaheer, 2004; Zaheer & Soda, 2009). At the micro level, there has always been an interest in network change (e.g., Newcomb, 1961; Burt, 2002) and new analytical developments (Snijders, van de Bunt, & Steglich, 2010) that deal with some of the tricky issues concerning statistical dependence promise to usher in a golden age of research on interpersonal network change. Some of the antecedents of change that might be relevant at the micro level include the following (as discussed in Brass, 2010): spatial, temporal, and social proximity (Festinger, Schacter & Back, 1950); homophily (e.g., McPherson, Smith-Lovin and Cook, 2001); balance (e.g., Heider, 1958); human and social capital (e.g., Lin, 1999); personality (e.g., Mehra, Kilduff, & Brass, 2001); social foci (e.g., Feld, 1981); and culture (e.g., Lincoln, Hanada, & Olson, 1981).

In terms of generating new theory over its relatively short history and alerting researchers to structural holes, Simmelian ties, ripple effects of personality on structure, and many other otherwise neglected or unseen phenomena, the organizational social network research program is certainly in a progressive phase (Galaskiewicz, 2007). As our focus on current debates illustrates, however, we want to dispel any sense of complacency. The social network research program as we have described it in this article has become so attractive that it has pulled in researchers from around the social sciences including, most recently, economics. Specifically, the discipline of economics has noticed the emerging focus within organizational social network research on the attainment of economic outcomes, with a recent influential volume (Jackson, 2008) promising to provide an overarching "framework for an analysis of social networks" (p. 3) that synthesizes research across the areas of "sociology, economics, physics, mathematics, and computer science" (p. xii). (See also the economic approach to social networks in Goyal, 2007.) To the extent that the social network research program continues to emphasize "competition between ego and alter" (Burt, 1987) and focuses on the ways in which "investment in social relations" leads to "expected returns in the marketplace" (Lin, 1999), then network research would appear to be attractive to those trained in economics. The future development of organizational social network research is likely to benefit from continuing debate between approaches rooted in disciplines such as economics and psychology. Such debates serve to articulate the core ideas that direct research.

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## References

- Ahuja, G. (2000). Collaboration networks, structural holes, and Innovation: A longitudinal study. *Administrative Science Quarterly*, 45, 425-455.
- Baker, W. E., & Faulkner, R. R. (1993). The social organization of conspiracy: Illegal networks in the heavy electrical equipment industry. *American Sociological Review*, 58, 837-860.
- Baker, W. E., & Faulkner, R. R. (2002). Interorganizational networks. In J. A. C. Baum (Ed.), *The Blackwell companion to organizations* (pp. 520-540). Oxford, UK: Blackwell.
- Balkundi, P., & Kilduff, M. (2005). The ties that lead: a social network approach to leadership. *Leadership Quarterly*, 16, 941-961.
- Balkundi, P., & Harrison, D. A. (2006). Ties, leaders, and time in teams: strong inference about network structure's effects on team viability and performance. *Academy of Management Journal*, 49, 49-68.
- Balkundi, P., Wang, L., & Harrison, D. A. (2009). Bridging the gap: Consequences of structural hole spanning at multiple levels. *Working paper*, SUNY Buffalo.
- Barden, J. O., & Mitchell, W. (2007). Disentangling the influences of leaders' relational embeddedness on interorganizational exchange. *Academy of Management Journal*, 50, 1440-1461.
- Barley, S. R. (1990). The alignment of technology and structure through roles and networks. *Administrative Science Quarterly*, 35, 61-103.

- Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17, 99-120.
- Bartkus, V. O. & Davis, J. H. (2009). *Social capital: Reaching out, reaching in*. Northampton, MA, Edward Elgar.
- Barsade, S. G. (2002). The ripple effect: Emotional contagion and its influence on group behavior. *Administrative Science Quarterly*, 47, 644-675.
- Baum, J. A. C. (2002). (Ed.). *The Blackwell companion to organizations*. Oxford, UK: Blackwell.
- Baum, J. A. C., Rowley, T., Shipilov, A. V., & Chuang, Y.-T. (2005). Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly*, 50, 536-575.
- Baum, J. A. C., Shipilov, A. V., & Rowley, T. (2003). Where do small worlds come from? *Industrial and Corporate Change*, 12, 697-725.
- Baum, J. A. C., & Singh, J. V. (1994). (Eds.). *Evolutionary dynamics of organizations*. Oxford, UK: Oxford University Press.
- Beckman, C. M., Haunschild, P. R., & Phillips, D. J. (2004). Friends or strangers? Firm specific uncertainty, market uncertainty, and network partner selection. *Organization Science*, 15, 259-275.
- Berkman, L. F., & Syme, L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, 109, 186-204.

- Bian, Y. (1997). Bringing strong ties back in: Indirect ties, network bridges, and job searches in China. *American Sociological Review*, 62, 366-385.
- Blau, P. M., & Schwartz, J. E. (1984). *Crosscutting social circles: Testing a macrostructural theory of intergroup relations*. Orlando, FL: Academic Press.
- Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management*, 29, 991-1013.
- Borgatti, S. P., Mehra, A., Brass, D. J., & Labianca, G. (2009). Network analysis in the social sciences. *Science*, 323, 892-895.
- Bott, E. (1957). *Family and social network: Roles, norms, and external relationships in ordinary urban families*. London, UK: Tavistock.
- Bougon, M. G., Weick, K. E., & Binkhorst, D. (1977). Cognition in organizations: An analysis of the Utrecht Jazz Orchestra. *Administrative Science Quarterly*, 22, 606-639.
- Bowler, M., & Brass, D.J. (2006). Relational correlates of interpersonal citizenship behavior, A social network perspective. *Journal of Applied Psychology*, 91, 70-82.
- Brass, D. J. (1984). Being in the right place: A structural analysis of individual influence in an organization. *Administrative Science Quarterly*, 29, 518-539.
- Brass, D. J. (1985). Men's and women's networks: A study of interaction patterns and influence in an organization. *Academy of Management Journal*, 28, 327-343.
- Brass, D. J. (2010). A social network perspective on industrial/organizational psychology. In S. Koslowski (Ed.), *Handbook of industrial and organizational psychology*, forthcoming.

- Brass, D. J., & Burkhardt, M. E. (1993). Potential power and power use: An investigation of structure and behavior. *Academy of Management Journal*, 36, 441-470.
- Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal*, 47, 795-819.
- Breiger, R. L. (1974). The duality of persons and groups. *Social Forces*, 53, 181-190.
- Burt, R. S. (1980). Cooptive corporate actor networks: A reconsideration of interlocking directorates involving American manufacturing. *Administrative Science Quarterly*, 25, 557-582.
- Burt, R. S. (1982). *Toward a structural theory of action*. New York: Academic Press.
- Burt, R.S. (1983). *Corporate profits and cooptation*. New York: Academic Press.
- Burt, R. S. (1987). Social contagion and Innovation: Cohesion versus structural equivalence. *American Journal of Sociology*, 92, 1287-1335.
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S. (1997). The contingent value of social capital. *Administrative Science Quarterly*, 42, 339-365.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior*, 22, 345-423.
- Burt, R. S. (2002). Bridge decay. *Social Networks*, 24, 333-363.

- Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110, 349-399.
- Burt, R. S. (2007). Second-hand brokerage: Evidence on the importance of local structure for managers, bankers, and analysts. *Academy of Management Journal*, 50, 110-145.
- Burt, R. S., & Ronchi, D. (1990). Contested control in a large manufacturing plant. In J. Wessie & H. Flap (Eds.), *Social networks through time* (pp. 121-157). Utrecht, Netherlands: ISOR.
- Christakis, N. A., & Fowler, J. H. (2007). The spread of obesity in a large social network over 32 years. *New England Journal of Medicine*, 357, 370-379.
- Christakis, N. A., & Fowler, J. H. (2008). The collective dynamics of smoking in a large social network. *New England Journal of Medicine*, 358, 2249-2258.
- Cohen, S., Doyle, W. J., Skoner, D. P., Rabin, B. S., & Gwaltney, J. M. (1997). Social ties and susceptibility to the common cold. *Journal of the American Medical Association*, 277, 1940-1944.
- Coleman, J. S. (1990). *Foundations of social theory*. Cambridge, MA: Harvard University Press.
- Coleman, J. S., Katz, E., & Menzel, H. (1966). *Medical innovation: A diffusion study*. New York: Bobbs-Merrill.
- Cook, K. S. (1982). Network structures from an exchange perspective. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis* (pp. 177-199). Beverly Hills, CA: Sage.

- Cook, K. S., Emerson, R. M., Gilmore, M. R., & Yamagishi, T. (1983). The distribution of power in exchange networks: Theory and experimental results. *American Journal of Sociology*, *89*, 275-305.
- Day, D. V., & Kilduff, M. (2003). Self-monitoring personality and work relationships: individual differences in social networks. In M. R. Barrick & A. M. Ryan (Eds.), *Personality and work: reconsidering the role of personality in organizations* (pp. 205-228). San Francisco: Jossey-Bass.
- De Soto, C. B. (1960). Learning a social structure. *Journal of Abnormal and Social Psychology*, *60*, 417-421.
- DiMaggio, P. (1986). Structural analysis of organizational fields: A blockmodel approach. *Research in Organizational Behavior*, *8*, 335-370.
- DiMaggio, P. (1997). Culture and cognition. *Annual Review of Sociology*, *22*, 263-287.
- Dorogovtsev, S. N., & Mendes, J. F. F. (2003). *Evolution of networks: From biological nets to the Internet and WWW*. Oxford, UK: Oxford University Press.
- Durkheim, E. (1951). *Suicide: A study in sociology*. (Translated by J.A. Spaulding & G. Simpson). New York: Free Press.
- Eagle, N., & Pentland, A. (2006). Reality mining: Sensing complex social systems. *Personal and Ubiquitous Computing*, *10*, 255-268.
- Eilstrup-Sangiovanni, M., & Jones, C. (2008). Assessing the dangers of illicit networks: Why al-Qaida may be less threatening than many think. *International Security*, *33* (2), 7-44.

Emirbayer, M., & Goodwin, J. (1994). Network analysis, culture, and the problem of agency.

*American Journal of Sociology*, 99, 1411-1454.

Erickson, B. H. (1988). The relational basis of attitudes. In B. Wellman & S. D. Berkowitz

(Eds.), *Social structures: A network approach* (pp. 99-121). New York: Cambridge University Press.

Feld, S. L. (1981). The focused organization of social ties. *American Journal of Sociology*, 86,

1015-1035.

Ferrin, D. L., Dirk, K. T., & Shah, P. P. (2006). Direct and indirect effects of third-party

relationships on interpersonal trust. *Journal of Applied Psychology*, 91, 870-883.

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups: A study of*

*human factors in housing*. Palo Alto, CA: Stanford University Press.

Flynn, F., & Wiltermuth, S. In press. Who's with me? False consensus, brokerage, and ethical

decision making in organizations. *Academy of Management Journal*.

Fowler, J. H., & Christakis, N. A. (2008). The dynamic spread of happiness in a large social

network. *British Journal of Medicine*, 337, no. a2338:1-9.

Freeman, L. C. (1992). Filling in the blanks: A theory of cognitive categories and the structure of

social affiliation. *Social Psychology Quarterly*, 55, 118-127.

Freeman, L. C., Romney, A. K., & Freeman, S. C. (1987). Cognitive structure and informant

accuracy. *American Anthropologist*, 89, 310-325.

Friedman, D., & McAdam, D. (1992). Collective identity and activism: Networks, choices, and the

life of a social movement. In A. D. Morris & C. M. Mueller (Eds.), *Frontiers in social movement theory* (pp. 156-173). New Haven, CT: Yale University Press.

- Galaskiewicz, J. (1985). *Social organization of an urban grant's economy*. New York: Academic Press.
- Galaskiewicz, J. (2007). Has a network theory of organizational behavior lived up to its promise? *Management and Organization Review*, 3, 1-18.
- Galaskiewicz, J., & Burt, R. S. (1991). Interorganizational contagion in corporate philanthropy. *Administrative Science Quarterly*, 36, 88-105.
- Gargiulo, M. (1993). Two-step leverage: Managing constraint in organizational politics. *Administrative Science Quarterly*, 38, 1-19.
- Gargiulo, M., & Benassi, M. (2000). Trapped in your own net: Cohesion, structural holes and the adaptation of social capital. *Organization Science*, 11, 183-196.
- Goyal, S. (2007). *Connections: An introduction to the economics of networks*. Princeton, NJ: Princeton University Press.
- Grabher, G., & Powell, W. W. (Eds.). (2004). *Networks* (vols. 1 & 2). Cheltenham, UK: Edward Elgar.
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 6, 1360-1380.
- Granovetter, M. (1979). The theory-gap in social network analysis. In P. W. Holland & S. Leinhardt (Eds.), *Perspectives on social network research* (pp. 501-518). New York: Academic Press.
- Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, 1, 201-233.

- Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*, 481-510.
- Granovetter, M. (2005). The impact of social structure on economic outcomes. *Journal of Economic Perspectives, 19*, 33-50.
- Gulati, R. (1998). Alliances and networks. *Strategic Management Journal, 19*, 293-317.
- Gulati, R. (2007). *Managing network resources: Alliances, affiliations and other relational assets*. Oxford: Oxford University Press.
- Gulati, R., & Gargiulo, M. (1999). Where do interorganizational networks come from? *American Journal of Sociology, 104*, 1439-1493.
- Gulati, R., Nohria, N., & Zaheer, A. (2000). Strategic networks. *Strategic Management Journal, 21*, 203-215.
- Hallen, B. L. (2008). The causes and consequences of the initial network positions of new organizations: From whom do entrepreneurs receive investments? *Administrative Science Quarterly, 53*, 685-718.
- Hambrick, D. C. (2007). The field of management's devotion to theory: Too much of a good thing? *Academy of Management Journal, 50*, 1346-1352.
- Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly, 44*, 82-111.
- Hargadon, A. B., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly, 42*, 716-749.

- Heider, F. (1946). Attitudes and cognitive organization. *Journal of Psychology*, *21*, 107-112.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Hirsch, P. M., & Levin, D. Z. (1999). Umbrella advocates versus validity police: A life-cycle model. *Organization Science*, *10*, 199-212.
- Hoffmann, W. 2007. Strategies for managing a portfolio of alliances. *Strategic Management Journal*, *28*, 827-856.
- Hummon, N. P., & Carley, K. (1993). Social networks as normal science. *Social Networks*, *15*, 71-106.
- Ibarra, H. (1992). Homophily and differential returns: Sex differences in network structure and access in an advertising firm. *Administrative Science Quarterly*, *37*, 422- 447.
- Ibarra, H., Kilduff, M., & Tsai, W. (2005). Zooming in and out: Connecting individuals and collectivities at the frontiers of organizational network research. *Organization Science*, *16*, 359-371.
- Ingram, P. & Morris, M. W. (2007). Do people mix at mixers? Structure, homophily, and the “life of the party.” *Administrative Science Quarterly*, *52*, 558-585.
- Jackson, M. O. (2008). *Social and economic networks*. Princeton, NJ: Princeton University Press.
- Janicik, G. A. & Larrick, R. P. (2005). Social network schemas and the learning of incomplete networks. *Journal of Personality and Social Psychology*, *88*, 348-364.
- Kanazawa, S. (2001). De gustibus est disputandum. *Social Forces*, *79*, 1131-1163.

- Kilduff, M. (1990). The interpersonal structure of decision making: A social comparison approach to organizational choice, *Organizational Behavior and Human Decision Processes*, *47*, 270-288.
- Kilduff, M. (1992). The friendship network as a decision-making resource: Dispositional moderators of social influences on organizational choice. *Journal of Personality and Social Psychology*, *62*, 168-180.
- Kilduff, M., & Brass, D. J. (2010). Job design: A social network perspective. *Journal of Organizational Behavior*, *31*, 309-318.
- Kilduff, M., Crossland, C., Tsai, W., & Krackhardt, D. (2008). Network perceptions versus reality: A small world after all? *Organizational Behavior and Human Decision Processes*, *107*, 15-28.
- Kilduff, M., & Krackhardt, D. (1994). Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy of Management Journal*, *37*, 87-108.
- Kilduff, M., & Krackhardt, D. (2008). *Interpersonal networks in organizations*. Cambridge: Cambridge University Press
- Kilduff, M., & Oh, H. (2006). Deconstructing diffusion: An ethnostatistical examination of *Medical Innovation* network data reanalyses. *Organizational Research Methods*, *9*, 432-455.
- Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. London, Sage.
- Klein, K. J., Lim, B., Saltz, J. L., & Mayer, D. M. (2004). How do they get there? An

- examination of the antecedents of centrality in team networks. *Academy of Management Journal*, 47, 952-963.
- Kogut, B. & Walker, G. 2001. The small world of Germany and the durability of national networks. *American Sociological Review*, 66, 317-335.
- Kraatz, M. S. (1998). Learning by association? Interorganizational networks and adaptation to environmental change. *Academy of Management Journal*, 41, 621-643.
- Krackhardt, D. (1990). Assessing the political landscape: Structure, cognition, and power in organizations. *Administrative Science Quarterly*, 35, 342-369.
- Krackhardt, D. (1998). Simmelian ties: Super strong and sticky. In R. M. Kramer & M. A. Neale (Eds.), *Power and influence in organizations*, (pp. 21-38). Thousand Oaks. CA: Sage.
- Krackhardt, D. (1999). The ties that torture: Simmelian tie analysis in organizations. *Research in the Sociology of Organizations*, 16, 183-210.
- Krackhardt, D., & Kilduff, M. (1999). Whether close or far: Social distance effects on perceived balance in friendship networks. *Journal of Personality and Social Psychology*, 76, 770-782.
- Krackhardt, D., & Kilduff, M. (2002). Structure, culture and Simmelian ties in entrepreneurial firms, *Social Networks*, 24, 279-290.
- Krackhardt, D. & Porter, L. W. (1985). When friends leave: A structural analysis of the relationship between turnover and stayers' attitudes. *Administrative Science Quarterly*, 30, 242-261.

- Krackhardt, D. & Porter, L. W. (1986). The snowball effect: Turnover embedded in communication networks. *Journal of Applied Psychology, 71*, 50-55.
- Kumbasar, E. A., Romney, K., & Batchelder, W. H. (1994). Systematic biases in social perception. *American Journal of Sociology, 100*, 477–505.
- Labianca, G. & Brass, D. J. (2006). Exploring the social ledger: Negative relationships and negative asymmetry in social networks in organizations. *Academy of Management Review, 31*, 596-614.
- Labianca, G., Brass, D. J., & Gray, B. (1998). Social networks and perceptions of intergroup conflict: The role of negative relationships and third parties. *Academy of Management Journal, 41*, 55-67.
- Lakatos, I. (1970). Falsification and the methodology of scientific research programs. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge* (pp. 91-132). New York: Cambridge University Press.
- Larson, A. (1992). Network dyads in entrepreneurial settings: A study of the governance of exchange processes. *Administrative Science Quarterly, 37*, 76–104.
- Lau, D. C., & Murnighan, K. J. (2005). Interactions within groups and subgroups: The effects of demographic faultlines. *Academy of Management Journal, 48*, 645-659.
- Laudan, L. (1977). *Progress and its problems: Towards a theory of scientific growth*. London: Routledge & Kegan Paul.

- Lavie, D. 2006. The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review*, 31, 638-658.
- Lavie, D. 2007. Alliance portfolios and firm performance: A study of value creation and appropriation in the us software industry. *Strategic Management Journal*, 28, 1187-1212.
- Lavie, D. & Miller, S. 2008. Alliance portfolio internationalization and firm performance. *Organization Science*, 19, 623-646.
- Lazega, E. (2001). *The collegial phenomenon: The social mechanisms of cooperation among peers in a corporate law partnership*. Oxford: Oxford University Press.
- Lee, R. (2009). Social capital and business and management: Setting a research agenda. *International Journal of Management Reviews*, 11, 247-273.
- Lewin, K. (1936). *Principles of topological psychology*. New York: McGraw-Hill.
- Lewin, K. (1951). *Field theory in social science: Selected theoretical papers*. New York: Harper & Brothers.
- Lin, N. (1999). Social networks and status attainment. *Annual Review of Sociology*, 25, 467-487.
- Lin, N., Cook, K. & Burt, R.S. (2001). *Social capital: Theory and research*. New York, Aldine de Gruyter.
- Lin, N., Ensel, W. M., & Vaughn, J. C. (1981). Social resources and strength of ties: Structural factors in occupational status attainment. *American Sociological Review*, 46, 393-405.

- Lincoln, J. R., Hanada, M., & Olson, J. (1981). Cultural orientation and individual reactions to organizations: A study of employees of Japanese-owned firms. *Administrative Science Quarterly*, 26, 93-115.
- McPherson, J. M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415-444.
- Mark, N. (1998). Beyond individual differences: Social differentiation from first principles. *American Sociological Review*, 63, 309-330.
- Marsden, P. V., & Podolny, J. (1990). Dynamic analysis of network diffusion processes. In J. Wessie & H. Flap (Eds.), *Social networks through time* (pp. 197-214). Utrecht, Netherlands: ISOR.
- Mayhew, B. (1980). Structuralism versus individualism: I—Shadowboxing in the dark. *Social Forces*, 59, 335-375.
- Mehra, A., Kilduff, M., & Brass, D. J. (1998). At the margins: A distinctiveness approach to the social identity and social networks of underrepresented groups. *Academy of Management Journal*, 41, 441-452.
- Mehra, A., Kilduff, M., & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly*, 46, 121-146.
- Mills, C. W. (1959). *The sociological imagination*. London: Oxford University Press.
- Mizruchi, M. (1996). What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates. *Annual Review of Sociology*, 22, 271-298.

- Monge, P. R. & Contractor, N. S. (2003). *Theories of communication networks*. Oxford, Oxford University Press.
- Moreno, J. L. (1934). *Who shall survive? A new approach to the problem of human interrelations*. Washington, DC: Nervous and Mental Disease Publishing.
- Newcomb, T. (1961). *The acquaintance process*. New York: Holt, Rinehart and Winston.
- Obstfeld, D. (2005). Social networks, the *tertius iungens* orientation, and involvement in innovation. *Administrative Science Quarterly*, 50, 100-130.
- Oh, H., & Kilduff, M. (2008). The ripple effect of personality on social structure: Self-monitoring origins of network brokerage. *Journal of Applied Psychology*, 93, 1155-164.
- Oh, H., Chung, M-H., & Labianca, G. (2004). Group social capital and group effectiveness: The role of informal socializing ties. *Academy of Management Journal*, 47, 860-875.
- Palmer, D. (1983). Broken ties: Interlocking directorates and intercorporate coordination. *Administrative Science Quarterly*, 28, 40-55.
- Palmer, D., Friedland, R., & Singh, J. V. (1986). The ties that bind: Organizational and class bases of stability in a corporate interlock network. *American Sociological Review*, 51, 781-796.
- Pastor, J-C, Meindl, J.R. & Mayo, M.C. (2002). A networks effects model of charisma attributions. *Academy of Management Journal*, 45, 410-420.
- Perry-Smith, J. E. (2006). Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal*, 49, 85-101.

- Podolny, J. M. (1998). Network forms of organization. *Annual Review of Sociology*, 24, 57–76.
- Podolny, J. M. (2001). Networks as the pipes and prisms of the market. *American Journal of Sociology*, 107, 33-60.
- Podolny, J. M. & Baron, J. N. (1997). Relationships and resources: Social networks and mobility in the workplace. *American Sociological Review*, 62, 673-693.
- Polanyi, M. (1944). *The great transformation: The political and economic origins of our time*. New York: Rinehart.
- Porter, K. A. , & Powell, W. W. (2006). Networks and organizations. In S. R. Clegg, C. Hardy, T. B. Lawrence, & W. R. Nord (Eds.), *The Sage handbook of organization studies* (pp. 776-799). London, UK: Sage.
- Portes, A. (2000). The two meanings of social capital. *Sociological Forum*, 15, 1-11.
- Powell, W. W. (1990). Neither market nor hierarchy: Network forms of organization. *Research in Organizational Behavior*, 12, 295-336.
- Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly*, 41, 116–145.
- Powell, W. W., White, D. R., Koput, K. W., & Owen-Smith, J. (2005). The growth of interorganizational collaboration in the life sciences. *American Journal of Sociology*, 110, 1132-1205.

- Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management*, 33, 479-516.
- Provan, K. G., & Kenis, P. (2007). Models of network governance: Structure, management, and effectiveness. *Journal of Public Administration, Research and Theory*, 18, 229-252.
- Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management Journal*, 41, 453-463.
- Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*, 6, 65-78.
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American democracy*. New York: Simon & Shuster.
- Reagans, R., & McEvily, B. (2003). Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly*, 48, 240-267.
- Reagans, R., Zuckerman, E., and McEvily, B. (2004). How to make the team: Social networks vs. demography as criteria for designing effective teams. *Administrative Science Quarterly*, 49, 101-133.
- Rhee, M., & Haunschild, P. R. (2006). The liability of good reputation: A study of product recalls in the US automobile industry. *Organization Science*, 17, 101-117.

- Rice, R. E., & Aydin, C. (1991). Attitudes toward new organizational technology: Network proximity as a mechanism for social information processing. *Administrative Science Quarterly*, 36, 219-244.
- Rumelt, R. P., Schendel, D. E., & Teece, D. (1994). Fundamental issues in strategy. In R. P. Rumelt & D. E. Schendel & D. Teece (Eds.), *Fundamental issues in strategy* (pp. 9-53). Boston, MA: Harvard Business School Press.
- Salancik, G.R. (1995). Wanted: A good network theory of organization. *Administrative Science Quarterly*, 40, 345-349.
- Saxenian, A. L. (1996). *Regional advantage: Culture and competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- Seibert, S. E., Kraimer, M. L., & Liden, R. C. (2001). A social capital theory of career success. *Academy of Management Journal*, 44, 219-237.
- Seidel, M-D. L., Polzer, J. T., & Stewart, K. J. (2000). Friends in high places: The effects of social networks on discrimination in salary negotiations. *Administrative Science Quarterly*, 45, 1-24.
- Shane, S., & Cable, D. (2002). Network ties, reputation, and the financing of new ventures. *Management Science*, 48, 364-381.
- Shipilov, A. V. (2006). Network strategies and performance of Canadian investment banks. *Academy of Management Journal*, 49, 590-604.

- Shipilov, A. V. (2009). Firm scope experience, historic multimarket contact with partners, centrality, and the relationship between structural holes and performance. *Organization Science, 20*, 85-106.
- Shipilov, A. V., Li, S. X., & Greve, H. R. (2009). The prince and the pauper: Search and brokerage in the initiation of status-heterophilous ties. Working paper, INSEAD.
- Snijders, T. A. B., van de Bunt, G. G., & Steglich, C. E. G. (2010). Introduction to stochastic actor-based models for network dynamics. *Social Networks, 32*, 44-60.
- Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology, 30*, 526-537.
- Snyder, M. (1979). Self-monitoring processes. *Advances in Experimental Social Psychology, 12*, 85-128.
- Soda, G., Usai, A., & Zaheer, A. (2004). Network memory: The influence of past and current networks on performance. *Academy of Management Journal, 47*, 893-906.
- Sparrowe, R. T., & Liden, R. C. (2005). Two routes to influence: Integrating leader-member exchange and network perspectives. *Administrative Science Quarterly, 50*, 505-535.
- Stevenson, W. B., & Greenberg, D. (2000). Agency and social networks: Strategies of action in a social structure of position, opposition, and opportunity. *Administrative Science Quarterly, 45*, 651-678.
- Stigler, G. J., & Becker, G. S. (1977). De gustibus non est disputandum. *American Economic Review, 67*, 76-90.

- Stokman, F. N. (2004). What binds us when with whom? Content and structure in social network analysis. Keynote address presented at the Sunbelt XXIV International Social Network Conference, Portoroz, Slovenia.
- Strang, D., & Tuma, N. B. 1993. Spatial and temporal heterogeneity in diffusion. *American Sociological Review*, 99, 614-639.
- Tichy, N. M., Tushman, M. L., & Fombrun, C. (1979). Social network analysis for organizations. *Academy of Management Review*, 4, 507-519.
- Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review*, 61, 674-698.
- Uzzi, B. (1997). Social structure and competition in inter-firm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42, 35-67.
- Uzzi, B., & Spiro, J. (2005). Collaboration and creativity: The small world problem. *American Journal of Sociology*, 111, 447-504.
- Uzzi, B., Guimera, R., Spiro, J., & Amaral, L. (2009). The emergence of self organizing collaboration networks: Northwestern University (<http://www.smith.umd.edu/seminars/pdfs/uzzi.pdf>).
- Van den Bulte, C., & Joshi, Y. V. (2007). New product diffusion with influentials and imitators. *Marketing Science*, 26, 400-421.
- Van den Bulte, C., & Lilien, G. L. (2001). Medical innovation revisited: Social contagion versus marketing effort. *American Journal of Sociology*, 106, 1409-1435.

- Van Rossem, R. (1996). The world system paradigm as a general theory of development: A cross-national test. *American Sociological Review*, *61*, 508-527.
- Wasko, M. M. L., Teigland, R., & Faraj, S. (2009). The provision of online public goods: Examining social structure in an electronic network of practice. *Decision Support Systems*, *47*, 254-265.
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge, England: Cambridge University Press.
- Watts, D. (1999). Networks, dynamics and the small world phenomenon. *American Journal of Sociology*, *105*, 493-527.
- Watts, D. J. (2003). *Six degrees: The science of a connected age*. New York: WW Norton.
- Wellman, B. (1988). Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S.D. Berkowitz (Eds.), *Social structures: A network approach* (pp. 19-61). New York: Cambridge University Press.
- Westphal, J. B., Boivie, S., & Chng, D. H. M. (2006). The strategic impetus for social network ties: Reconstituting broken CEO friendship ties. *Strategic Management Journal*, *27*, 425-445.
- White, H. C., Boorman, S. A., & Breiger, R. L. (1976). Social structures from multiple networks: Blockmodels of roles and positions. *American Journal of Sociology*, *81*, 730-779.
- Xiao, Z. & Tsui, A. S. (2007). When brokers may not work: The cultural contingency of social capital in Chinese high-tech firms. *Administrative Science Quarterly*, *52*, 1-31.

Zaheer, A., & Soda, G. (2009). Network evolution: The origins of structural holes. *Administrative Science Quarterly*, 54, 1-31.

Zuckerman, E. W. (1999). The categorical imperative: Securities analysts and the illegitimacy discount. *American Journal of Sociology*, 104, 1398-1438.

## Endnotes

<sup>1</sup> Social utility has been understood, for individual actors, as the economic returns resulting from strategic exploitation of network positions. In this sense, the social utility idea is often referred to as social capital. However, social capital has become an umbrella terms that can refer to such disparate ideas as "civic spirit grounded on impartial application of the laws" (Portes, 2000: 4) and "investment in social relations with the expected returns in the marketplace" (Lin, 2001: 19). Thus, we avoid use of the term social capital here to avoid the confusion the term has generated and to focus on social network theory and research. (See Adler & Kwon, 2002, for a cogent discussion of the history and usage of the term social capital).

<sup>2</sup> We are indebted to Andrew Shipilov for this section on node characteristics at the firm level.

<sup>3</sup> These definitions derive in part from Brass, 2010 and Kilduff and Tsai, 2003.

Table 1 Organizational Social Network Core Ideas

	Key citations
<b>Social relations:</b> social network research involves the study of sets of actors and the relations that connect and divide them	Freeman. 2004; Tichy, N. M. et al., 1979.
<b>Embeddedness:</b> actors are embedded within a network to the extent that they show a preference for transacting with network members or to the extent that social ties are forged, renewed, and extended through the community rather than through actors outside the community.	Granovetter, 1985; Uzzi, 1996.
<b>Structural patterning:</b> beneath the complexity of social relations there are enduring patterns of clustering, connectivity, and centralization.	Wellman & Berkowitz, 1988; White et al., 1976;
<b>Utility of network connections:</b> social network connections constrain and facilitate outcomes of importance to individuals and groups.	Burt, 1992; Nahapiet & Ghoshal, 1998.

**Appendix:** Glossary of Social Network Technical Terms <sup>3</sup>

**Actors** -- individuals or organizational units between which social relations form.

**Alter** -- an actor in a network to whom the focal actor (designated as *ego*) is connected.

**Appropriability** -- one type of tie (e.g., friendship) is appropriated for a different purpose (e.g., economic transaction).

**Centrality** -- the extent to which an actor occupies a central position in a network by having many ties to other actors (i.e., *degree centrality*), by being able to reach many other actors (i.e., *closeness centrality*), by connecting other actors who have no direct connections (i.e., *betweenness centrality*), or having connections to centrally located actors (i.e., *eigenvector centrality*).

**Blockmodeling** -- a technique for partitioning actors into subsets and identifying relationships or a lack of relationships among the subsets.

**Centralization** -- the extent to which a network is centralized around one or a few actors.

**Clique** -- a group of actors in which everyone has a direct tie to everyone else, and there is no external actor to whom all group members have a tie.

**Closure** -- when all members of the network have easy access to monitoring and information leading to norms of reciprocity and trust. Often measured by density.

**Connectivity** -- minimum number of actors or ties that must be removed to disconnect the network.

**Core-periphery** -- extent to which network is structured such that core members connect to everyone and periphery members connect only to core members and not to other members of the periphery.

**Correspondence analysis** -- an analytical procedure available in social network software packages such as Ucinet that provides a visual depiction of how two types of entities are similar. Thus, in the example given in this paper (Figure 2), we show for each Minneapolis-area CEO the relative closeness of the CEO to other CEOs with respect to membership of clubs and corporate boards.

**Cutpoint** -- an actor whose removal from the network results in subsets of actors between whom there is no connection.

**Density** -- the number of ties in a network divided by the maximum number of ties that are possible. The more actors there are in a network, the greater the likelihood that density will be low.

**Dyad** -- two actors connected by a tie.

**Ego** -- the focal actor in a social network as distinct from *alters* to whom ego is connected.

**Egocentric network** -- the social network surrounding ego, including the ties among ego's direct ties. Thus, Alan's egocentric friendship network includes information concerning whether Alan's friends are friends with each other or not.

**Homophily** -- the tendency for actors to form connections with and share the opinions and behaviors of others who are similar in terms of demography (e.g., gender, ethnicity, educational attainment) or any other attribute (e.g., personality, values).

**Multiplexity** -- the extent to which two actors are connected by more than one type of relationship (such as being friends as well as being workmates).

**Reciprocity** -- a friendship relationship is said to be reciprocated if actor A is friends with actor B and actor B is friends with actor A; otherwise, the relationship is considered unreciprocated or asymmetric.

**Small-worldedness** – extent to which network is structured such that actors are clustered into small clumps with a few connections among clumps that result in a short average distance among actors.

**Social capital** -- at the individual level, social capital consists of benefits or potential benefits that accrue to an actor as a result of social network connections. At the communal level, social capital consists of civic spirit, community trust, and adherence to beneficial norms.

**Social structure** -- the configuration of interactions among actors in a social network.

**Sociogram** -- a diagram in which actors are depicted as points, and ties among actors are represented as lines.

**Strength of tie** -- a "combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" (Granovetter, 1973:1361). Strong ties are frequent, long-lasting and affect-laden (Krackhardt, 1992: 218-219), whereas weak ties are "infrequent and distant" (Hansen, 1999:84).

**Structural hole** -- a gap in the social network between two actors that can be spanned or is spanned by another actor (Burt, 1992).

**Transitivity** -- if an actor has two friends, then the triad consisting of the actor and the two friends is transitive if the friends are friends with each other. Similarly, in considering influence relationships, a social network consisting of four actors is transitive if the following is true: actor A influences only B, C, and D; actor B influences only C and D; actor C influences only actor D; and actor D influences no other actor.

**Whole network** -- a network that incorporates a complete set of actors and all the ties among the actors (as distinct from an egocentric network).

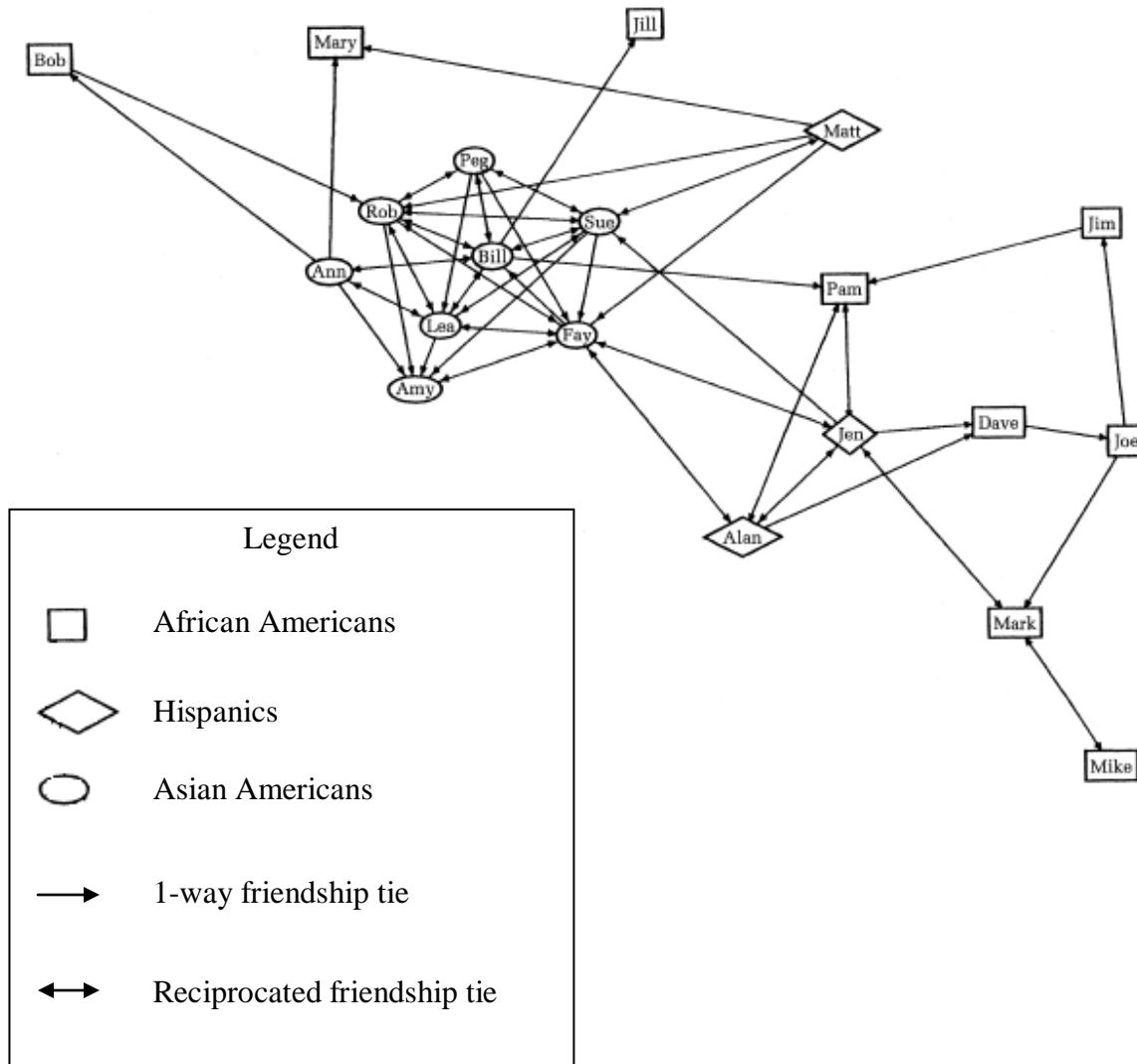


Figure 1 Social Relations among Actors (from Mehra, Kilduff, & Brass, 1998).

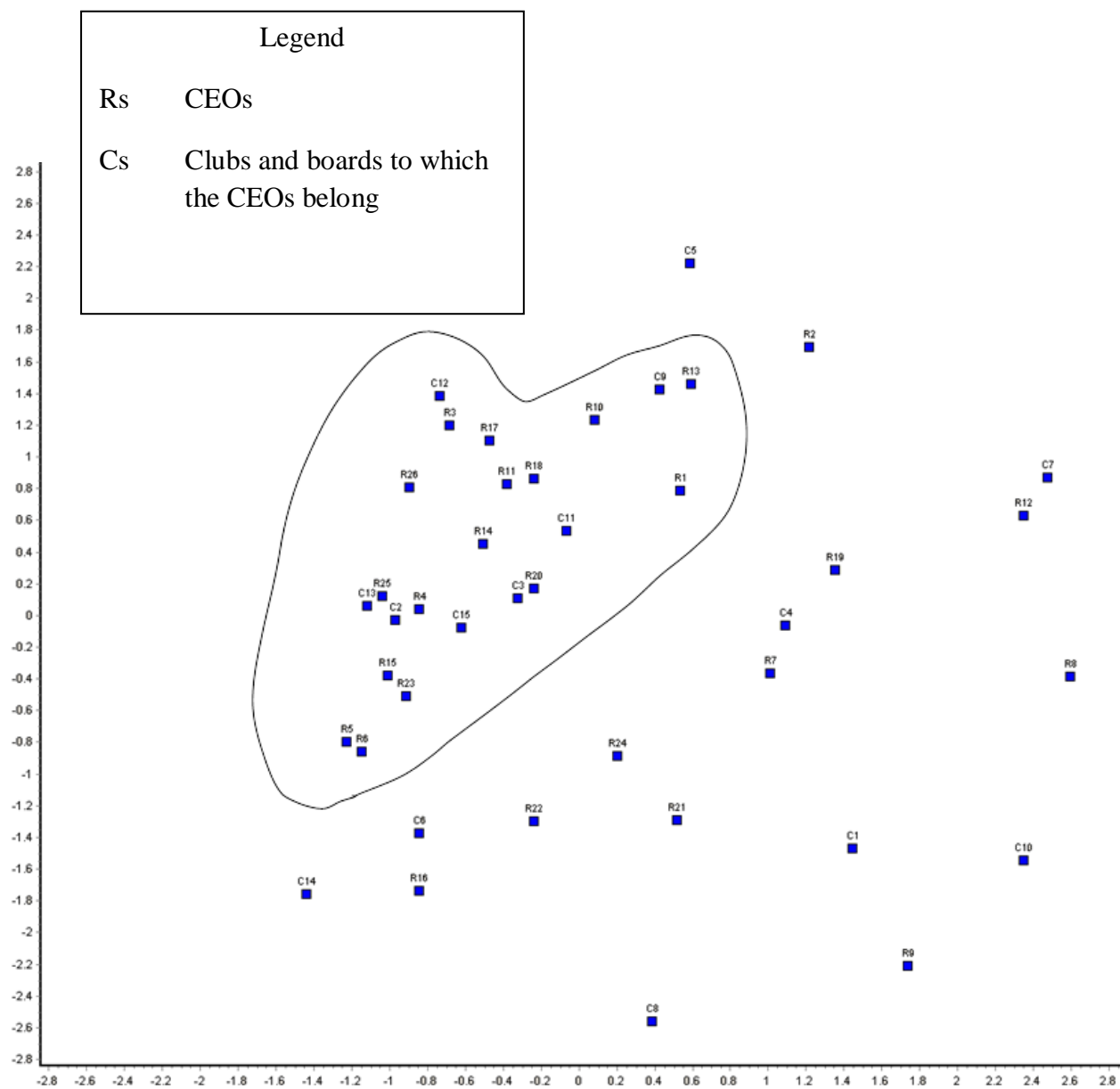


Figure 2 The Social Structure of Business Leaders in Minneapolis