It’s the Connections: The Network Perspective in Interorganizational Research

by Akbar Zaheer, Remzi Gözubüyük, and Hana Milanov

Executive Overview

The application of social network analysis to interorganizational contexts has seen an explosion of interest in the past several years. We argue that not only does the network or structural perspective add explanatory power to scholarly understanding of organizations’ behavior and outcomes, but that it expands the universe of observed phenomena from an autonomous to a relational view for studying and explaining organizational action and outcomes. We develop an organizing framework based on three levels of network analysis (the dyad, the ego, and the whole network) and four theoretical mechanisms (resource access, trust, power/control, and signaling) to organize and review the key findings and debates in the interorganizational network literature. We point to avenues for future research based on the linkages across the boxes in our framework, gaps in the framework, and finally, extensions beyond the framework.

In the past three decades, social network research in the organizational and interorganizational contexts has led to the accumulation of a significant stock of knowledge (see Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve, & Tsai, 2004; and Parkhe, Wasserman, & Ralston, 2006, for recent reviews). The literature is vast and diverse and has an extensive history in a number of fields (such as organizational sociology, political science, organization theory, and strategy) at many different levels of analysis (such as the individual or interpersonal, group, firm, industry, and country). In this survey we restrict ourselves to the application of social network analysis to the interorganizational or interfirm level, which comprises ties between organizations or firms (hereafter used interchangeably), such as strategic alliances, buyer-supplier relationships, director interlocks, investment bank ties, personnel movement links, and cross-patent citation ties.

The logic of the social network perspective applied to the interorganizational level (hereafter simply the network perspective or approach) is, most fundamentally, that the pattern or structure of ties among organizations and the tie strength and content have a significant bearing on firm behavior and on important firm outcomes such as performance. Put another way, in contrast to the approach taken by fields such as neoclassical economics, where the firm is viewed as an autonomous, even isolated, entity striving to use its resources to compete with other similarly autonomous and self-reliant entities, the network approach posits that firms access resources and capabilities through their networks of interfirm linkages (Gulati, 1999). As such, the network approach changes the perspective from an autonomous, self-reliant view of organizational action and outcomes to one that is essentially relational. The power of the network approach thus derives not just from increasing the variance explained in firm-level outcomes, but from viewing the world from a structural rather than (or in addition to) an autonomous lens, thus representing a distinct (and arguably more complete) worldview, particularly...
in contrast to the neoclassical approach that has had considerable influence in the field (Gulati, Nohria, & Zaheer, 2000).

Of course, network scholars do not claim that network structure is the only, or even the primary, determinant of firm-level outcomes—internal organizational capabilities or resources clearly account for a large proportion of the variance in a firm’s performance outcomes. At the same time, organizations are both empowered and constrained by their existing patterns of ties. Consequently, taken together, networks both enable and constrain firm behavior, action, and outcomes. Thus, the embeddedness of the firm in a network of interorganizational relationships sheds additional light on how and why firms act and perform the way they do. Some recent research combines the internal capability view with the structural perspective to explain firm performance (Zaheer & Bell, 2005).

An important but frequently overlooked issue with the structural approach is the somewhat heretical notion that the network perspective does not by itself constitute a theoretical lens. At the extreme, this view argues that the network approach is little more than a methodology. Because network ties can encompass virtually any kind of association between social actors or organizations, the causal processes through which network ties exert their effects on organizational outcomes can be highly varied. Therefore, it is incumbent on the researcher to provide an explanation of the underlying process or, in other words, to “supply the theory.” All the network approach suggests, at its most fundamental level, is that “structure matters.” But the hows, whys, and wherefores are left to the imagination and creativity of the researcher in decoding and interpreting the pattern of results. In turn, the results are a function of the design choices made by the researcher in the construction of network data. Presenting a convincing explanation as to how and why the chosen network ties act as the pipes that carry the identified content between and among organizations, which then make the chosen outcome come about, is the key challenge researchers take on when opting for the network approach.

Our purpose in this review is twofold: one, to present some key network concepts and the findings that have emerged from applying those concepts to interorganizational contexts, and two, to highlight areas where future research might go (or “what we know and what we need to know”). In building a basis for future research, we create an organizing framework, first highlighting four basic theoretical approaches applied in network studies and then outlining the three levels of analyses at which interorganizational networks are theorized to operate.

Organizing the Literature: What We Know and Need to Know

When we examine the literature, two distinct patterns emerge. First, while there is no single theory of interorganizational networks, the research is embedded in multiple yet distinct theoretical approaches (at times intertwined) to explain the phenomenon. The literature on interorganizational networks originally emerged from the interest in the various benefits that relationships provide. Therefore, much of the work has borrowed from traditional theoretical frameworks (such as resource dependency) in order to explain the theoretical mechanisms that link network phenomena to organizational outcomes (often performance). Unfortunately, as a cumulative body of work, this approach has resulted in a lack of coherence and parsimony. Specifically, various traditional theories have been used to explain the same network phenomena. At the same time, we find examples where multiple theories are incorporated into the model without considering (or at least being explicit about) the assumptions underlying these theories. Believing that research should fundamentally distinguish between them, we classify the literature in terms of causal theoretical mechanisms behind the operation of the network.

A second pattern that emerges from the literature is the multiplicity of levels of analysis. We believe it is important to make distinctions between levels of analysis in order to provide a more complete understanding of a set of phenomena that is inherently multilevel. Moreover, a clear understanding of the level at which
the research is conducted also helps us investigate the connections across these levels, a focus that has so far been largely neglected. As a result, most research in the field can naturally be categorized by the level of analysis—an approach we adopt as well.

Overall, the organizational research on social networks can be grouped under multiple theoretical mechanisms—we identify four—and further classified by three levels of analysis (see Table 1). Each of the resulting subcategories creates a matrix that not only helps with organizing the vast literature, but serves as a starting point for our concluding section where we identify prospective areas that are largely neglected by extant research, as well as areas of the matrix that are currently “filled” that may be further developed.

Table 1
Organizing Framework for Interorganizational Network Research

<table>
<thead>
<tr>
<th>Theoretical Mechanism</th>
<th>Levels of Analysis</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dyad</td>
<td>Ego</td>
</tr>
<tr>
<td></td>
<td>Weak Ties → Explicit Knowledge Transfer</td>
<td>Shan et al. (1994)</td>
</tr>
<tr>
<td></td>
<td>Exploitation Context → Strong Ties</td>
<td>George et al. (2001)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structural Holes → Capabilities and Learning McEvily &amp; Zaheer (1999)</td>
</tr>
<tr>
<td></td>
<td>Trust → Performance</td>
<td>Centrality → Trust Ingram &amp; Roberts (2000)</td>
</tr>
<tr>
<td></td>
<td>Zaheer et al. (1998)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bae &amp; Gargiulo (2004)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual Dependence → Constraint Absorption Casciaro &amp; Piskorski (2005)</td>
<td></td>
</tr>
<tr>
<td>Signaling</td>
<td>Future Research</td>
<td>Bonacich Centrality as Status Benjamin &amp; Podolny (1999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jensen (2003)</td>
</tr>
</tbody>
</table>

Theoretical Mechanisms

The interorganizational networks literature has been related to a large number of theories, such as social capital (Bourdieu, 1986; Burt, 1992; Coleman, 1988; Lin, 2001), the resource-based view (Gulati, 1999), resource dependence theory (Bonacich, 1987; Pfeffer & Salancik, 1978), social status (Podolny, 1993, 2001), signaling (Spence, 1973), trust (Zaheer, McEvily, & Perrone, 1998), and the relational view (Dyer & Singh, 1998). These theories explore and explain interorganizational network issues. Despite their distinctiveness, it is important to realize that the domains of these theories have significant overlaps. Taking just two of the theories mentioned above as an example, both the relational view and social capital theory argue that networks provide access to
resources and capabilities from outside the organization. At the same time, there are areas in which these theories differ widely in their explanations for the workings of networks. Using the same example, social capital theory has a strong power and control component (i.e., in invoking the structural entrepreneur or tertius gaudens (the “laughing third”) that may fall outside the boundaries of the relational view, which relies more on trust.

A thorough study of the cumulative body of theories utilized by the field allows us to identify a set of four cross-cutting mechanisms that underlie the operation of interorganizational networks. Moreover, these four mechanisms allow a clearer distinction of the operation of networks, which in turn facilitates an understanding of research gaps and future directions. At the same time, they also comprehensively cover the theoretical ground, thus being both collectively exhaustive, to the extent possible, and parsimonious. The four mechanisms are networks as resource access, as a source of trust, as a tool for power and control, and as a signaling mechanism. Each paper in the interorganizational networks literature uses one, and sometimes more than one, of these theoretical mechanisms. A note on terminology: In network parlance, “ego” refers to the focal actor (the firm or organization) and “alter” to the actors (i.e., firms) to which ego is connected in the network.

Networks as Resource Access

Networks are often studied as an important source of resources and capabilities. The resources can originate from the characteristics of the relationships, from the structure of the ego-network itself, or from alters’ characteristics. The most frequently cited resource that networks provide is information. Certain network structures (i.e., networks rich in structural holes) provide more diverse and timelier information than other structures (Burt, 1992). The effectiveness of information transfer is based on the fit between the strength of the network tie (Granovetter, 1973) and the quality of the information being transferred (Hansen, 1999), with strong or “multiplex” ties transferring more “fine-grained” information (Uzzi, 1996).

Networks as a Source of Trust

Networks are also theorized to give rise to trust. Coleman (1988) suggested that higher closure (the extent to which alters are connected to each other) in a network leads to higher overall trust. In the management literature, higher levels of trust are associated with lower transaction costs, which increase the efficiency of interorganizational relationships such as alliances and joint ventures (Beamish & Lupton, 2009). Thus, for example, companies that are embedded in high-closure networks may have better functioning alliances with lower costs. Furthermore, certain regional networks, like other networks that are high in closure, have higher levels of trust and may outperform lower closure networks (Saxenian, 1994).

Networks as a Source of Power and Control

Networks are said to both increase and constrain the power of the actors. One explanation for the locus of power in interorganizational relationships derives from resource dependence theory (Aldrich & Pfeffer, 1976; Mizruchi, 1989; Pfeffer & Salancik, 1978, 2003), which suggests that the power of partners over a focal firm increases with the increasing dependence of the firm on the resources of these partners. Beyond observing power in individual dyads, from a structural perspective, a smaller company can constrain the power of a powerful company by bringing third parties into the network (Bae & Gargiulo, 2004). Following the same line of argument, Burt (1992) argued that bridging structural holes gives power and control to the actor spanning the hole since it can play off one alter against another.

Networks as Signaling Mechanisms

Finally, networks also function as signals or “prisms” in the marketplace, meaning that quality of an actor can be inferred from its relationships, particularly when there is no effective way to measure the quality of that actor (Podolny, 1993, 2005). For example, the quality and status of newcomers to an industry can be inferred from their relationships with high-status organizations (Baum, Calabrese, & Silverman, 2000). An alli-
ance with a large pharmaceutical firm may be construed as a sign of quality for a new biotechnology company (Stuart, Hoang, & Hybels, 1999).

Levels of Analysis

For the second dimension of our organizing framework we identify three levels of analysis in the literature: the dyadic, ego, and whole network levels. A commonly used conceptualization that implies the dyadic level is relational embeddedness (which refers to the nature of the dyadic ties). Structural embeddedness corresponds to the ego level and specifically to the position of ego in the overall network. In addition to these levels, recent developments on the overall mathematical properties of networks and the integration of regional clusters literature with social networks literature has led to a focus on whole network as the third level of analysis.

Dyadic Level

At the dyadic level, researchers focus on the characteristics of the relationship between two linked organizations. The key issue in the dyadic level perspective is to understand the nature of the relationship between the actors in terms of relational characteristics such as tie strength (Granovetter, 1973) or the degree of trust (Ring & Van de Ven, 1992; Zaheer et al., 1998), and how these relational characteristics affect the likelihood of the relationship’s renewal, continuation, dissolution, or other outcomes. According to Dyer and Singh (1998), there are four sources of interorganizational competitive advantage, or rents: relation-specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance.

The overall findings in this area suggest the following ideas: Repeated ties between two organizations enhance the trust between them and engender future ties (Gulati, 1995; Gulati & Gargiulo, 1999). Further, high interorganizational trust between the two organizations lowers transaction costs and allows for the extraction of higher benefits from the relationship (Zaheer et al., 1998). Embedded ties (close interpersonal relationships across managers in different organizations) help firms increase performance (Ingram & Roberts, 2000). However, overembeddedness can hurt economic performance by making firms vulnerable to environmental changes due to the limited diversity of information to which they have access (Uzzi, 1997). Strong ties are better for the transfer of tacit knowledge, whereas weak ties aid the transfer of explicit knowledge and information search (Uzzi & Lancaster, 2003). Also, strong ties are better for performance when the environment demands high levels of exploitation behavior, as in the steel industry. In contrast, weak ties improve performance when the environment demands high levels of exploration behavior, as in the semiconductor industry (Rowley, Behrens, & Krackhardt, 2000). Also, in a dyadic relationship, the partner that is needed more is argued to have more power (Pfeffer & Salancik, 1978).

Ego Level

Research at the ego level—at a high level of generalization—refers to the kind of effects that ego’s network has on its behavior and performance. More specifically, these effects result from ego’s connections, the connections among ego’s alters, the characteristics of alters, and the overall structural position of ego within the whole network. Hence, the locus of attention is not on the characteristics of each relationship per se, but rather on the structure of relationships surrounding the organization (ego). The majority of network measures, and consequently the majority of the interorganizational networks literature, falls into this category. We first explain the main network concepts at this level—centrality, structural holes/closure, and structural equivalence—and then discuss the literature that uses these concepts.

Centrality. Social network scholars have defined and developed various mathematical measures to identify the most important or prominent actors in a network (Wasserman & Faust, 1994). An actor is said to be prominent if its ties make it visible to the other actors in the network. Knack and Burt (1983) argued that there exist two forms of prominence: centrality and prestige. A central actor is involved in many ties; a prestigious actor receives many ties (or “in-ties”).
Hence, in determining some aspects of centrality, the directionality of ties matters, as networks may be formed by either directional or nondirectional relationships. In a directional relationship network, centrality measures focus on choices “sent” (“out-ties”), whereas prestige measures focus on choices “received.” For example, in a directional board interlock network, the more central organization will be the one that reports the larger number of “sent” directors (own directors participating in other firms’ boards), whereas the most prestigious organization will be the one that is receiving the highest number of other firms’ board members. Clearly, this distinction becomes impossible to trace in networks formed by nondirectional relationships. Nevertheless, both centrality and prestige measures have been frequently used in this literature (e.g., Tsai, 2001). Two of the more commonly used types of centrality are degree centrality and Bonacich centrality.

Degree centrality is the most basic of all the centrality measures and refers to the number of ties an actor has with other actors. It is a simple count of the number of the actor’s relationships. An actor with a high degree of centrality is in direct contact with many other actors, is recognized as a major channel of information, and thus is highly visible and prominent (Wasserman & Faust, 1994).

In addition to computing centrality as the number of direct ties, Bonacich (1972) considered the centrality of the ego’s alters and used a coefficient to account for the fact that alter centrality may change the overall centrality score of ego. The size of the coefficient is based on an eigenvector measure and is a measure of the importance or weight given to the centrality of alters and in turn to their alters. Compared to simple degree centrality, the Bonacich measure provides a more global representation of ego’s centrality in the overall network.

Structural Holes and Closure. A structural hole exists between two actors when they are connected to the same other actor but are not connected to each other (see Figure 1). Burt (1992) famously argued that actors that bridge structural holes will gain information and control benefits relative to actors that have alters that are connected to one another. The information benefits are theorized to come about in three ways: access, timing, and referrals. Access benefits refer to “receiving a valuable piece of information and knowing who can use it” (Burt, 1992, p. 13). Timing refers to receiving information (e.g., a market opportunity) before other actors, while referral benefits are reflected in the actor’s name being mentioned at the right time and at the right place to provide opportunities for the actor. Control benefits stem from being the tertius gaudens. Ego gains either by being the third between two or more players in the same type of relationship or by being the third between players in two or more relationships with conflicting demands.

Closure (Coleman, 1990) refers to the opposite of structural holes, and is often measured as ego-network density. A network with complete closure is one in which all actors are connected to one another, and in such cases density reaches its theoretical maximum of one. A network high in closure is said to increase cooperation and trust (Coleman, 1990), increasing knowledge sharing among actors (Rowley et al., 2000) and thus actors’ performance (Ahuja, 2000; Uzzi, 1997). As we discuss below, a large body of research in the field has taken it upon itself to resolve the empirical question of whether and under what conditions closure is more beneficial than structural holes.

Figure 1
Structural Hole Illustration

A’s ties to B and C bridge the structural hole
two actors do not need to have a direct relationship between them. The concept of structural equivalence has been extended to the related notion of role equivalence, which occurs when the two actors have ties to the same types of alters but not the same alters.

**Research at the Ego Level.** The most basic finding from this literature stream can be summarized as “centrality increases performance” (Tsai, 2001, 2002). A firm’s centrality in the alliance network has been shown to increase its innovation output in the chemical (Ahuja, 2000) and biotechnology (Shan, Walker, & Kogut, 1994) industries. Furthermore, higher degree centrality increases a firm’s absorptive capacity (George, Zahra, Wheatley, & Khan, 2001) and its rate of new product development (Deeds & Hill, 1996). Baum, Calabrese, and Silverman (2000) showed that the size of the focal biotech firm’s alliance network (i.e., higher degree centrality) at founding is positively related to its performance measured by multiple indicators: revenue, R&D spending growth, employment growth, and patenting rate. Similarly, having a larger alliance network has been shown to increase other performance outcomes for new ventures, such as shorter time periods between a company’s founding and undergoing an IPO (Chang, 2004) and increased venture capitalist investment (Baum & Silverman, 2004). In a cross-level study, Ingram and Roberts (2000) showed that the centrality of a hotel manager in the friendship network of hotel managers in Sydney increased the occupancy rate for the hotel. These findings suggest that a firm’s degree centrality in alliance networks and managers’ degree centrality in interpersonal managerial networks are beneficial for firm performance in terms of various outcome dimensions such as growth, innovation output, and financial success.

Another group of findings from this line of research stems from a long and lively debate regarding the structural determinants of social capital (Burt, 2000, 2001; Lin, 2001). Ironically, the positive, yet never observed, construct of social capital is said to be generated by both structural holes and closure, although conceptually these two constructs are exact opposites. Specifically, Burt (1992) argued that networks rich in structural holes create social capital for an actor, whereas conversely Coleman (1988, 1990) argued that closure does. In reconciling these conflicting views, one approach argues that structural holes and closure are complementary rather than competing mechanisms (Burt, 2000, 2001; Reagans & Zuckerman, 2001). In this line of thinking, groups need to access diverse information resources from outside group boundaries, but individuals within the group need to share this diverse information with one another in order to be effective. More generally, when there is competition, such as outside the group, structural holes create social capital, but when there is a need for cooperation, for example within the group, closure creates social capital (Burt, 2001). For example, Reagans and Zuckerman (2001) found that both within-group network density and out-group network diversity increased the productivity of R&D teams in their study.

The second line of research addresses this debate by integrating the structural hole and closure perspectives and arguing for a contingency approach. Soda, Usai, and Zaheer (2004) used the contingency of time to discriminate between the value of structural holes and that of closure. They showed that past, but not current, closure is valuable, while at the same time, current, but not past, structural holes are. Koka and Prescott (2002) theorized about social capital as a multidimensional construct and argued that both information richness (which results from strong ties as well as from dense networks) and information diversity (which results from structural holes) are dimensions of social capital. An empirical study by Rowley and colleagues (2000) showed that in environments that favor exploitation strategies, the density of ties among a firm’s direct partners increases its performance; in contrast, in environments that favor an exploration strategy, tie density decreases performance, suggesting the nature of knowledge as the contingency that differentiates between the value of closure and that of structural holes.

Finally, a third group of results comes from another research stream that deals with the role of network status in explaining organizational performance. While we have thus far focused more on the network’s function as “pipes” through which content travels, status-oriented studies focus on the network’s function as “prisms” from which organizational quality can be inferred (Podolny, 2001). Viewed through a network lens, status is argued to be a strong signal of quality (Podolny, 1993), which facilitates entry into new markets (Jensen, 2003), aids in finding partners for exploring novel domains (Dimov & Milanov, 2009), influ-
ences reactions of the financial community (Stuart et al., 1999), and ultimately enhances organizational performance (Shipilov & Li, 2008). In addition, high-status firms generally incur lower transaction costs in acquiring resources and are perceived to be more desirable exchange partners (Podolny, 1993). Status considerations also delineate the set of actively considered potential partners (Jensen & Roy, 2008). In the venture capital (VC) industry, high-status VC firms have important affiliations with investment banks (Gulati & Higgins, 2003), which have been shown to facilitate investment exits via IPOs or acquisitions and thus enhance their performance (Hochberg, Ljungqvist, & Lu, 2007).

Whole Network Level

Recently, network scholars have started focusing on the whole networks. At this level, scholars predominantly investigate the characteristics and behavior of the entire interorganizational network, such as its centralization (Provan, Fish, & Sydow, 2007) or its “small-worldness” (Barabasi, 2002), and examine outcomes at the whole network level. However, recent studies have also begun to investigate the effects of whole networks on individual firms’ outcomes. For example, Gilsing, Nooteboom, Vanhaverbeke, Duysters, and van den Oord (2008) highlighted the contingency effects that whole network properties create for the relationships between individual firms’ ego-network positions and their creation of novelty.

An early paper that focused on the whole network mapped out the strategic “blocks” in the global auto industry, as determined by the interorganizational linkages among all the companies in the industry (Nohria & Garcia-Pont, 1991). Also, the success of some regions is explained by the prevalence of interorganizational networks. For example, Saxenian (1994) compared Silicon Valley with Boston’s Route 128 and argued that the success of Silicon Valley came from the extensive interpersonal networks that linked organizations to one another. These networks allowed firms in Silicon Valley to tap into information and resources of other firms and benefited the whole region, whereas companies along Route 128 jealously protected their information, hurting the region’s performance as a whole. As well, research on knowledge spillovers suggests that networks as a whole embody the mechanisms that drive spillovers within and across regions (e.g., Almeida & Kogut, 1999). Recently, scholars have started to point to the complex relationships among geography, networks, and regional performance (e.g., Bell & Zaheer, 2007)—a fruitful research area since the mechanisms behind the causes and consequences of geographical agglomeration clearly lie within the domain of interorganizational networks.

The research stream on the “small-worldness” property of networks was initiated by the cutting-edge work in mathematics and physics that formalized networks’ mathematical properties (Albert & Barabasi, 2002; Barabasi, 2002; Watts, 1999, 2003). Small-world networks are characterized by clusters of locally dense cliques (a high clustering coefficient), connected via a few bridging ties (or a low average of the shortest path distances in the network) (Watts, 1999). Recent simulations have suggested that by following two simple rules we can understand the emergence of small-world networks: (a) the network keeps growing as nodes are added to it, and (b) new actors are keen to form ties with existing actors in the network, in proportion to incumbents’ existing ties (“preferential attachment”) (Barabasi, 2002). Similarly, Uzzi, Guimera, Spiro, and Amaral (2006) showed that a model of network emergence can be explained by two factors: the propensity of actors to form teams made up of links to incumbents in the network, and the propensity of actors to form teams made up of links to their past collaborators in the network.

In the management literature, research suggests that small-world networks enhance firms’ and groups of firms’ innovativeness (Baum, Shipilov, & Rowley, 2003; Fleming, King, & Juda, 2007; Uzzi & Spiro, 2005; Verspagen & Duysters, 2004) as a result of more effective knowledge transfer across them (Schilling & Phelps, 2007). These and other noteworthy studies (Baum et al., 2003; Davis, Yoo, & Baker, 2003) represent important strides in our understanding of the emergence and implications of whole network properties.
Future Research

We identified two dimensions—theoretical mechanisms and levels of analysis—that delineate the interorganizational networks literature and explained the current state of research using the organizing framework generated by these dimensions. We now discuss the implications of our review for future research in three broad themes that build on our framework: linkages across the boxes in our framework (vertically and horizontally), gaps in the framework, and finally extensions beyond the framework (trade-offs, dynamics, and broadening networks). We address each of these in turn.

Linkages Across Boxes

A bird’s-eye review of the literature suggests that most studies can be placed within one of the 12 boxes in Table 1. Little research crosses level boundaries (the horizontal movement across boxes in Table 1). This is particularly problematic when similar mechanisms may be at work at different levels. For example, trust is conceptualized as both a dyadic construct and an ego-level construct. In one of the few studies that crosses levels, Rowley et al. (2000) argued and demonstrated that these two levels of networks are substitutes: Companies embedded in dense ego-networks need fewer strong dyadic ties. We discuss this idea further below.

Whenever the boundaries between mechanism boxes are crossed (vertically), it is through the use of different mechanisms at the same level of analysis. For example, research in one of the most heated debates in the field, about the value of structural holes versus closure, occurs at the ego level but crosses as many as three vertical mechanism boxes between access to information resources, power, and trust. In general, when relying on multiple mechanisms, researchers should be clearer about the workings of each of the alternative mechanisms that underlie network operation. For example, how do we know whether it is power or information access or the lack of trust that is causing the outcomes? Similarly, how do we disentangle the effects of signaling from the effects of access to resources? Furthermore, how do we know that they are not both driven by a third factor that affects one or both of these factors—one of the issues giving rise to endogeneity?

Horizontal Movement Across Boxes

Future research could be extended by examining each of the identified mechanisms and how it operates across different network levels (horizontally in our framework). Following the earlier example (Rowley et al., 2000), scholars could extend the mechanisms of trust in a study across networks (for example, across industries) and examine whether whole network characteristics, such as density (which promotes transparency and solidarity in the industry), affect the nature of dyadic ties (such as tie strength). Another mechanism that could be explored across levels (again, moving across horizontal boxes) is that of power. Dyadic power differences may give rise to disadvantaged alters seeking partnerships among one another, which would enhance their structural positions and weaken that of the stronger partner (Bae & Gargiulo, 2004).

Vertical Movement Across Boxes

The use of multiple theories and mechanisms, which we referred to earlier as the crossing of vertical boxes in Table 1, is a worthy but challenging endeavor because researchers need to both theoretically and empirically establish the precise nature of the mechanisms behind the observed outcomes. For example, as we noted earlier, structural hole theory relies on at least two mechanisms for its operation: (a) timeliness and access to information diversity and (b) power and control over the disconnected alters. But it is often not made clear which of these mechanisms lies behind the observed outcome. When using multiple theories or mechanisms in research, it is important to try to eliminate alternative explanations. For example, Zaheer and Soda (2009) specifically measured information diversity and included it in a model to tease out the effect of structural holes on performance. In instances where this strategy is not feasible, researchers could distinguish between operative mechanisms by identifying and operationalizing contingencies that differentiate between the mechanisms.
Gaps in the Framework

As our framework demonstrates, despite many contributions within and across boxes, there has been an uneven degree of research attention given to specific boxes. For example, while much of the research on a dyadic level has focused on the “pipes” function of dyads in terms of the resources that flow through them and dependencies they create (Podolny, 2001), few studies focus on the signaling properties of ties at a dyadic level. For instance, in board interlock research, one might study the implications of removing a director from another company’s board. Are organizations cast in a negative light when they are “abandoned” by a trusting partner? Similarly, are there liabilities for trustworthiness or reputation stemming from “abandoning” one’s partners? Contributing to another scarcely studied box at the intersection of signaling and the whole network level, an interesting research question may be how industry density, as a proxy for the speed and reliability of information transmission, influences the effectiveness of firms’ signaling mechanisms, which are argued to be more important in situations where the focal actor’s quality is unobservable. One could argue that in dense networks, the status value of an additional relationship may be limited. Two other boxes that would benefit from more research attention are the intersection of the power/control and trust mechanisms at the whole network level. While scholars have studied the emergence of small-world structures and small worlds’ consequences for innovation, small worlds are also characterized by significant brokerage. Hence, research might examine the power and trust implications of small-world networks.

Extensions Beyond the Framework

In addition to these implications for future research that derive directly from our framework, we identify below another set of future research directions that either apply to the framework as a whole or represent extensions beyond the framework: trade-offs in network outcomes, dynamics, and broadening networks.

Trade-offs

Almost all the extant research focuses on the positive effects of interorganizational networks (see Jensen, 2008, and Reagans & Zuckerman, 2008, for exceptions) without considering the trade-offs that emanate from the negative consequences of network membership. Much potential exists for future research that considers what is sometimes referred to as the dark side of social capital (Gargiulo & Benassi, 1999; Portes, 1998). For example, how do firms manage the trade-off between the “public good” nature of trust with the private benefits of access to resources? How do organizations balance the benefits of trust and embeddedness with the costs of lock-in and inflexibility with the same set of partners?

Another stream of research in this vein focuses predominantly on the benefits of affiliating with prominent partners due to the resulting endorsements (Stuart et al., 1999) that such affiliations provide. However, little research has tried to study the possibility that such affiliations may have certain negative consequences or should be guarded against. One recent study that did (Katila, Rosenberger, and Eisenhardt, 2008) started by challenging the premise that having prominent partners is inherently good for signaling purposes, and argued instead that entrepreneurial companies may be at a disadvantage when approaching “corporate sharks” as partners. In another example, Ahuja, Polidoro, and Mitchell (2009) began to explore the potential liabilities of partnering with central and prominent firms. Their study found a somewhat vicious cycle: Poorly embedded firms that succeed in partnering with central organizations need to be willing to take minority positions in such alliances. While this sacrifice indeed allows noncentral firms their first endorsement from a central partner, agreeing to the lesser terms may keep them from attracting subsequent central partners as it signals weakness, and may make it difficult for the focal firm to move toward the center.

Following these directions, multiple research questions can be addressed across levels of analysis. At the ego level, much research has focused on the positive effects of various types of centrality.
However, future research might examine whether current knowledge ignores the potential for a large ego network to have a downside (Goerzen, 2005). Taken literally, findings from current literature would encourage managers to increase their alliance and managerial networks ad infinitum. While increasing network size reduces the focal organization’s dependence on any particular partner, continually growing the alliance network is clearly not possible, because actors are limited in the development of new ties and maintenance of existing ones by time and resource constraints (Burt, 1992). Hence, research on centrality could benefit from exploring potential trade-offs between expanding the ego network and running into resource constraints.

Teasing out the negative consequences of networks can also be studied on the overall network level. For example, we know that industry network density helps organizations to integrate the diverse inputs obtained from their direct contacts because high network density means that information and norms travel faster around the network (Gilsing et al., 2008). However, while such density may result in greater trust and collaboration, it may also reach a point where it becomes hard for any individual organization to protect its proprietary knowledge and could result in greater litigation or reduced innovation. Research addressing this question could help enlighten some of these currently underinvestigated areas.

Network Dynamics

Like much extant management research, social network research is often criticized as being static, but owing to multiple calls to include more dynamic research in the field we are beginning to see a shift from cross-sectional to more longitudinal studies of networks (Ahuja, Soda, & Zaheer, 2008; Brass, Galaskiewicz, Greve, & Tsai, 2004; Parkhe et al., 2006). While collecting longitudinal data for any type of research is challenging, such research is important for deepening our theoretical insights on network origins, dynamics, and change (Ahuja et al., 2009), but also for the theoretical and methodological treatment of endogeneity—an issue that equally plagues much management research (Bascle, 2008; Hamilton & Nickerson, 2003; Shaver, 1998). Unfortunately, cross-sectional studies cannot provide answers critical for addressing many assumptions that underlie network studies, one of the most prominent being that structure drives firm behavior or performance. In this context, network structure is often implicitly assumed to be exogenous.

For example, claiming that centrally positioned actors perform better is open to two endogeneity criticisms: (a) simultaneity, the possibility that the better performance allows actors to be centrally positioned (due to having higher attractiveness as a partner or more resources to maintain the ties), and (b) unobserved heterogeneity, the possibility that there is some other actor characteristic (such as human capital or firm capabilities) that enabled the actor to both perform better and become more central. The takeaway is that simplistically observing a network structure only as an antecedent (as is common in much of the work) may be missing an important causal mechanism that explains the emergence of that very structure, or the concurrent interaction between structure and performance. These types of issues cannot be resolved with cross-sectional studies.

As is evident from this discussion, endogeneity is not only an important methodological challenge, but also a key theoretical phenomenon that at least partly explains network evolution. Among the notable contributions in this domain is work by Gulati and Gargiulo (1999), who presented an endogenous model of network evolution that demonstrates how past networks influence the formation of new ones and found regularities in such behavior across three industries. Still, there are many issues to be addressed in order to better understand how networks emerge, dissolve, or change. For example, one group of pressing questions relates to understanding the conditions under which actors adapt, maintain, or dissolve relationships in contrast to other accounts that highlight network stability and path dependence (Baum et al., 2003; Walker, Kogut, & Shan, 1997). As well, although we know much about the informational advantages of bridging structural holes, it is not as clear whether firms actively orchestrate such positions, and if so, how they maintain them and prevent closure of their net-
works (Ahuja et al., 2008). Similarly, given their less privileged position, how do the firms being brokered respond upon realizing the limitations of their position in the network?

A related group of questions concerns opening the black box of the coevolution of outcomes, behaviors, and structures—a stream of literature that is just emerging. For example, a recent study by Shipilov and Li (2008) examined how structure (as captured by structural holes and status) and performance coevolve. In another recent study, Zaheer and Soda (2009) made progress in disentangling the effects of network content and structural holes on performance, while at the same time accounting for the factors that facilitate or inhibit the emergence of structural holes. Methodologically, these studies also provide examples of how to tackle endogeneity between structures and outcomes by using specialized statistical procedures such as two- and three-stage least squares (Shipilov & Li, 2008; Zaheer & Soda, 2009). Theoretically, these studies are exemplary efforts to dig deeper into network antecedents and dynamics and their coevolution with performance outcomes, areas where we still need more research effort.

It is also worth pointing out that software developments in empirically modeling change and understanding the coevolution of “network structure together with relevant actor attributes as joint dependent variables in a longitudinal framework” (Snijders, Steglich, & Schweinberger, 2007, p. 3) are well worth exploring. This model may be helpful in addressing chicken-and-egg type questions, such as: Do more socially responsible organizations structure their networks to partner with other such organizations (a homophily, or selection argument), or does the focal firm adopt socially oriented policies as a result of partnering with socially responsible organizations (a reciprocal influence argument)?

Broadening Networks

Another way to expand current network research across the framework concerns the membership set of the network. Extant research often first chooses the industry relevant to the phenomenon of study, and accordingly limits the actor-set based on this industry membership. Focus on a single industry carries strong advantages related to the homogeneity in meaning and duration of relationships (Ahuja, 2000) and other comparable practices within the industry, but as in any study, limits the generalizability of findings. While many influential studies follow the single-industry strategy (e.g., Ahuja, 2000; Stuart, 1998), several noteworthy examples have tried to examine the generalizability of network phenomena across industries (e.g., Gulati & Gargiulo, 1999; Rosenkopf & Schilling, 2007; Rowley et al., 2000). Still, crossing industry boundaries offers more research possibilities. Specifically, broadening the definition of what constitutes the network beyond comparative industry studies can help us reach deeper insights into network coordination and evolution.

In addition to broadening the network concept across industries, future research could explicitly consider the embeddedness of social actors in multiple networks. The few studies that have done so in the past have implicitly tended to treat each of the networks as independent. In particular, we surmise that contemporaneous membership in multiple networks provides organizations with access to different network resources (Gulati, 1999), opportunities, and constraints because the nature of ties, identity of the nodes, and the processes in each network differ on one or more dimensions (Podolny & Baron, 1997). Yet, extant research is for the most part silent on possible complementarities and redundancies across multiple networks in influencing organizational behavior and outcomes. Hence, to the extent that there is an overlap in the information that organizations receive through multiple networks, opportunities for efficiency can arise in managing both networks. For example, maintaining a scientific or board network may justify dissolving some of the focal firm’s alliances. Similarly, while we know that both midlevel (Rosenkopf, Metiu, & George, 2001) and top management team social capital (Eisenhardt & Schoonhoven, 1996), as well as board interlocks (Gulati & Westphal, 1999), can translate directly into interorganizational alliances, much network research still ignores the fact that the embedding of organizations in multiple
networks is interdependent rather than independent (Gözübüyük, 2008).

Examining multiple networks also offers possibilities for cross-level theorizing. Cross-level theories refer to the “models specifying relationships among variables at different levels” (Rousseau, 1985, p. 14). Embeddedness arguments (Granovetter, 1985), for example, make implicit assumptions about the cross-level effects: The social relationships of individuals affect behavior and performance of the organizations (Ingram & Roberts, 2000; Uzzi, 1996, 1997). The research on social networks and embeddedness does not explicitly differentiate between single-level and cross-level studies. One line of research takes the view that organizations are embedded in interpersonal relationships (Ingram & Roberts, 2000; Uzzi & Lancaster, 2003), whereas another takes the view that organizations are embedded in interorganizational alliances networks (Gnyawali & Madhavan, 2001; Rowley et al., 2000). While the mechanisms that explain the relationship between embeddedness and firm performance at both levels of analysis involve information and knowledge transfer, they may also include separate, even different, mechanisms. An important challenge for future research is to tease out the mechanisms that cross levels of analysis and those that do not, and when and under what conditions they do.

Yet another way to enrich understanding of network consequences is to account for isomorphism—“the degree to which constituent components of a phenomenon and the relationships among the components are similar across levels of analysis” (House, Rousseau, & Thomas-Hunt, 1995, p. 88). For example, applied to the structural hole and closure research stream, accounting for isomorphism might help explain why structural holes in interpersonal networks are found to increase individual performance (Brass et al., 2004; Burt, 1992), but the evidence is mixed for that relationship at the interorganizational level (Brass et al., 2004). Moreover, while firm performance may benefit from structural holes in the networks of its managers (McEvily & Zaheer, 1999; Zaheer & Bell, 2005), firm innovation may suffer when firms span structural holes in the network of strategic alliances (Ahuja, 2000). More explicit cross-level research to tease out isomorphic effects across levels would enhance scholarly understanding in this domain.

Concluding Remarks

Our goal in this paper was twofold: (a) to organize the concepts and findings from the vast literature on interorganizational relations in management that uses the network perspective and (b) to suggest some promising directions for future research. We emphasize that while the network perspective affords us a fundamentally different lens with which to explain organizational action and outcomes, no automatic theory undergirds the approach. Rather, providing the theory is incumbent on the researcher. To organize the literature, we picked four theoretical mechanisms that represent dominant explanations for organizational action using the network perspective, and identified three levels of network analysis—the dyadic, the ego, and the whole network—for each. We also generated future research directions in terms of linkages across the boxes of our organizing framework, gaps in the framework, and extensions beyond the framework.

References

Bae, J., & Gargiulo, M. (2004). Partner substitutability, alliance network structure, and firm profitability in the


Gulati, R. (1999). Network location and learning: The influence of network resources and firm capabilities on


