A PARADIGM TOO FAR? A DYNAMIC STABILITY RECONSIDERATION OF THE SOCIAL NETWORK RESEARCH PROGRAM

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Instead of paradigmatic unity, we call for progressive theory development from a set of core concepts (Lakatos, 1970) comprising primacy of relations, ubiquity of embeddedness, social utility of connections, and structural patterning of social life. Organizational network research can capture complexity and distinctiveness of individuals and networks in terms of mutual constitution and change. The goal is not to delineate small puzzles whose outcomes are predetermined but to signal bold ideas concerning new phenomena.

Many social network researchers celebrate the puzzle-solving nature of their field, use "paradigm" as a mark of approval, and advance claims that network research has achieved the status of a self-contained school with its own theories and methods. Indeed, it is hard to find any other area of social science that makes such consistent claims for paradigmatic coherence (Freeman, 2004: 6). Almost thirty years ago, Leinhardt (1977) described the study of social networks as representing "a developing paradigm." In a later review, Hummon and Carley asserted that a mature paradigm had been established such that "the field has achieved 'normal science' status" (1993: 73). In more recent discussions within the field of management (e.g., Borgatti & Foster, 2003) and outside it (e.g., Degenne & Forsé, 1999), researchers have continued this endorsement of paradigmatic status. As one leading contributor to network research

summarized recently, "Social network analysis is one of the few social science endeavors in which people influence one another. . . to build a cumulative body of knowledge . . . . a 'normal' science in the sense described by Thomas Kuhn. . . . [one] that both generates puzzles and solves them" (Freeman, 2004: 6).

Given the burgeoning importance of social network research for the field of organizational studies,[1] the claim that network research should strive for and endorse the importance of paradigmatic status deserves special scrutiny. There is a danger in further emphasizing the importance of theoretical consensus within a shared paradigm at a time when new theoretical directions that recognize organizations as complex

[1] The success of organizational network research is evidenced by the network theme of the meeting of the Academy of Management in Denver in 2002; by special issues appearing in our major journals (e.g., see Brass, Galaskiewicz, Greve, & Tsai, 2004, and Parkhe, Wasserman, & Ralston, 2006); and by the volume of work exploring such topics as social capital (e.g., Leenders & Gabbay, 1999; Tsai & Ghoshal, 1998), leadership and networks (Balkundi & Kilduff, 2005), networks of individuals versus collectivities (Ibarra, Kilduff, & Tsai, 2005), network ties (Andrews & Knoke, 1999; Grandori, 1999; Nohria & Eccles, 1992), knowledge transfer networks (Tsai, 2001), interfirm alliances (Nooteboom, 1999), and network methods (e.g., Degenne & Forsé, 1999; Knoke & Kuklinski, 1982; Schensul, LeCompte, Trotter, Cromley, & Singer, 1999; Scott, 2000; Wasserman & Faust, 1994).

adaptive systems are possible. Celebration of unanimity and pursuit of puzzle solving pose dangers for any scientific field, given that it is competition between groups of researchers and their theories that drives scientific progress (Archer, 1996: 232–238). In organizational network research, a tendency toward narrow specialism limits the consideration of important alternative world views and restricts theoretical potential (Parkhe et al., 2006). The legacy of Thomas Kuhn (1962) casts a long shadow not just over social network research but over organizational research in general (e.g., Burrell & Morgan, 1979), with ongoing debate over whether we should have one unified paradigm or different incommensurate paradigms (e.g., Pfeffer, 1993; Van Maanen, 1995).[2]

Rather than revisit this paradigm-centered debate or return to a simplistic emphasis on falsificationism, we emphasize scientific progress through theoretical ferment within an ongoing research program (Lakatos, 1970). We identify core ideas driving social network research, critique existing articulations of these ideas, and offer our own approach focused on dynamic stability. To look ahead, we see organizational networks as complex adaptive systems that exhibit both persistence and change. Small investments in social ties can produce large returns to social capital—an example of nonlinear change—and organizational networks exhibit persistence of core structural properties, such as centralization, even in the face of nonlinear dynamics (Cilliers, 1998).

Lakatos (1970) offered the most influential scientific alternative to Kuhnian thinking, incorporating key aspects of Popper's (1959) emphasis on bold conjectures and open debate with a recognition that the appropriate unit of scientific appraisal is the sequence of historically related theories that make up a research program. Lakatos (1970), through his indictment of the paradigm approach to science, sought to rescue the autonomy of theory from the triviality of puzzle solving, to challenge the claimed incommensurability of rival research approaches, and to provide a rational basis for the progress from one theory to another. In contrast to Popper's (1959) approach, a progressive research program is driven not by refutations but by the development of new theories that point to new phenomena possibly ruled out by other research programs. In contrast to Kuhn (1962), Lakatos (1970) rejected the emphasis on normal science as the criterion of scientific progress, and he also rejected the necessity of uncritical acquiescence in current theoretical orthodoxy within a paradigm (see the discussion in Larvor, 1998).[3]

From Lakatos's (1970) perspective, theoretical progress must involve the nurturing and articulation of leading ideas that give a research program its impetus and originality. Through an interpretive understanding of the "hard core" of conceptual ideas distinctive to a research program, researchers generate new theories and hypotheses, potentially increasing the empirical scope of the central ideas—a process of extrapolation and empirical prediction described in terms of the "positive heuristic" of the research program.[4] Researchers intuitively understand that the hard-core ideas are off-limits in terms of empirical testing. Indeed, for a mature research program, the hard core is declared irrefutable by methodological decision of its protagonists—a process described by Lakatos (1970) as the negative heuristic of the research program. Thus, a progressive scientific program is buffered from

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[2] Organizational network researchers have, over the years, striven to impose order on the often bewildering variety of perspectives included within the network approach (e.g., Raider & Krackhardt, 2002), but there is still a concern that the increasing popularity of the network concept has "not brought clarity to a subject that is already broad and eclectic" (Baker & Faulkner, 2002: 520) and that the network approach suffers from a lack of coherence and underachievement (Parkhe et al., 2006). Part of the confusion surrounding whether network research has achieved paradigmatic status may derive from the many related meanings of "paradigm" in organizational studies, reflecting the diversity of uses in Kuhn's (1962) original work (as pointed out by Masterman, 1970). We thank an anonymous reviewer for reminding us of this.

[3] Despite the importance of Lakatos's challenge to the paradigm approach to science, his work has had little influence on debates in organizational studies. (But see Boal and Willis [1983] for an exception, and see Burawoy [1990] and Vasquez [1997] for Lakatosian approaches to social science research. For an overview of the work of Lakatos, see Larvor [1998], and see Chalmers [1999] and Newton-Smith [2000] for balanced treatments of the respective approaches of Kuhn and Lakatos.)

[4] The positive heuristic of the research program also includes characteristic problem-solving techniques (Larvor, 1998: 53), such as, in the case of network research, the set of algorithms and methods for detecting network properties (Borgatti, Everett, & Freeman, 1999).

disconfirmation by a continually replenishing set of "protective belt" theories, developed heuristically from the core ideas.

Theory is autonomous in that it can surge ahead of empirical results in the spirit of its heuristic understanding of the core ideas (Larvor, 1998).[5] The protective belt theories take the brunt of empirical testing and are expected to be updated and changed to the extent that the research program is progressive. We propose adding to the protective belt a dynamic stability approach that, in the spirit of the positive heuristic, draws from the core concepts to advance organizational social network research. This new approach emphasizes the recursive complexity and distinctiveness of both actors and networks and the ongoing mutual constitution of perceived and actual structures.

DEFINING THE HARD CORE

As a first step in articulating a distinctive scientific research program, we specify what, in our judgment, constitutes a parsimonious set of core scientific beliefs or assumptions from which research can proceed. This set of assumptions represents an updated understanding of the dynamic metaphysical core of organizational network research (cf. Lakatos, 1970) relevant to our unfolding research program. Although organizational network researchers occasionally have referred to "core network concepts" (e.g., Knoke, 2001: 328–330), the emphasis previously has been on the classification of categories of ties (Wasserman & Faust, 1994: 17–20) and the identification of analytical and empirical procedures (Freeman, 2004: 3).

Our emphasis on leading ideas at the core of organizational network thinking is compatible with but goes beyond (in specificity, emphasis,

and detail) an earlier attempt, from a sociological perspective, to define the intellectual underpinnings of structural analytic research (Wellman, 1988). The core ideas at the heart of a research program require time and detailed research effort in order to be delineated (Lakatos, 1970). Thus, our expression of core network research ideas builds on past efforts but is updated for a contemporary organizational network research audience.

We specify four beliefs borrowed both from the overarching structuralist network tradition (see Berkowitz, 1982, and Wellman & Berkowitz, 1988, for introductions) and from concepts (such as social capital and embeddedness) whose core importance has emerged more recently. In updating these concepts—and grafting them onto familiar ideas within the structural network field—we signal a progressive problem shift (Lakatos, 1970) in the field of network research specifically targeted at an organizational audience. Thus, we take ideas familiar to network researchers and sharpen their focus to motivate the new protective belt theoretical endeavor articulated in this paper.

There are at least four interrelated principles we consider central to the construction of the protective belt of new theoretical ideas outlined here: the primacy of relations between organizational actors, the ubiquity of actors' embeddedness in social fields, the social utility of network connections, and the structural patterning of social life. We indicate below the extensive evidence showing that these ideas are indeed central and recurring in network research. The recent *AMR* special issue on social network theory contains further evidence of the continuing development of ideas related to the importance of relations (Labianca & Brass, 2006), embeddedness (Hagedoorn, 2006), social utility of relations (Oh, Labianca, & Chung, 2006), and structural patterns (Kim, Oh, & Swaminathan, 2006).

Two sets of protective belt theories that, we suggest, can be clearly derived from these four core principles currently generate most organizational social network research: one set of theories focuses on the structural configuration of the network system itself, whereas the other set coalesces around the centrality of individual actors. Our approach seeks to draw from the core concepts to articulate a new protective belt approach that incorporates both structural complexity and individual-level understandings.

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[5] Within what Lakatos (1970) called a "degenerating" research program, researchers struggle to defend the core ideas themselves from empirical disconfirmation or indifference. Awkward empirical disconfirmations force changes on the protective belt theories and undermine the authority of the leading ideas themselves, resulting in ad hoc attempts to shore up the hard core with ideas borrowed from outside the research program. This is not the fate we seek for organizational network research, but it is, we fear, the inevitable fate of any field where researchers use the Kuhnian prescription of consensus and puzzle solving as a model for scientific development and where they fail to articulate the leading ideas from which new theory develops.

The Primacy of Relations

This is the most regularly invoked difference between network research and conventional social science research. In the earliest systematic treatments of the network perspective in organizational research, there are explicit statements such as the following: "The social network approach views organizations in society as a system of objects (e.g., people, groups, organizations) joined by a variety of relationships" (Tichy, Tushman, & Fombrun, 1979: 507). More recent surveys of organizational network research echo this earlier emphasis, representing network research as part of a general movement "away from individualist, essentialist and atomistic explanations toward more relational, contextual and systemic understandings" (Borgatti & Foster, 2003: 991). The importance of systems of relations between actors is a "core belief that underlies modern social network analysis" (Freeman, 2004: 16). In structural configuration research, relations between actors are considered properties of the whole system (Wellman, 1988: 26), whereas in actor centrality research, actors are envisaged as strategically rearranging their own personal relationships to maximize advantage (Burt, 1992).

The Ubiquity of Embeddedness

The embeddedness principle long has been invoked in sociology (Barber, 1995) and in organization theory (Dacin, Ventresca, & Beale, 1999), building from its emergence in institutional economics (Polanyi, 1944; see the discussion in Krippner, 2001). Following Granovetter (1985), organizational network researchers generally take for granted that behavior, even economic behavior, is embedded in networks of interpersonal relationships (e.g., Uzzi, 1996). The concept of embeddedness is "central to the social networks perspective" (Schweizer, 1997: 739). The importance of embeddedness increases to the extent that markets are inefficient (Burt, 1992), but even in relatively perfect markets there is evidence that actors' embeddedness in friendship networks helps create and validate choice criteria (Kilduff, 1990). Actors' behaviors are embedded to the extent that the actors show a preference for interacting not with complete strangers but, rather, with acquaintances, personal friends, and family members, or if their exchange partners tend to transact with each other. Embeddedness can also refer to the nesting of social ties within other social ties. For example, actors are embedded to the extent that social ties tend to be forged within a community that has few ties with the outside.

In structural configuration research, the embeddedness principle typically is invoked in terms of path dependence: as a network system grows, a node that started out with more than the average number of ties will tend to preferentially attract relations from new nodes (Barabasi & Albert, 1999). In actor centrality research, the concept of embeddedness is invoked in terms of a two-step process. The optimal structural embeddedness involves leaving no holes in one's own important personal networks but discovering gaps to exploit in the social networks of others (Burt, 1992).

The Social Utility of Network Connections

Like embeddedness, the social utility principle is ambiguous and far-reaching, with an extensive body of literature devoted to its explication and intellectual history (see, for example, the review of social capital in Farr, 2004). For individual actors (whether people or organizational units), the utility of social connections includes economic returns resulting from the strategic exploitation of positions in networks (see Burt, 2000, for a comprehensive review). But there is also another meaning at the system level. Communal utility inheres in certain types of social institutions (such as voluntary associations) that promote trust and interdependence (Coleman, 1990). At this communal level, the utility of social connections has been described as a pervasive kind of "civic spirit" (Portes, 2000) that can promote economic well-being (Putnam, 1993).

In structural configuration research, the utility to be gained from network connections involves improving the efficiency of the entire network. For example, randomly reallocating a small number of ties among actors can sometimes drastically improve the efficiency with which the whole network operates (Watts, 1999: 241). Actor centrality research emphasizes individuals gaining utility through the entrepreneurial exploitation of social network positions of centrality (Burt, 1992; Gnyawali & Madhavan, 2001).

The Structural Patterning of Social Life

One of the assumptions of organizational network research is that the apparent complexity of social life can be explained in terms of a pattern of "connectivity and cleavage" (Wellman, 1988: 26), a set of structural positions (such as a block model—see the overview in DiMaggio, 1986), a set of structural dynamics (see Carley, 1999, for an overview of the search for "simple learning mechanisms"), or some other representation that offers both a parsimonious model and a generative explanation of the emergence of complexity (Barley, 1990; White, Boorman, & Breiger, 1976). Network researchers try to "reach the underlying social structural factors" that cause outcomes (Burt, 1992: 4). Recent work on how, within some highly complex networks, actors can reach each other through a small number of intermediaries (the "small world" effect) exemplifies this search for a generative, structural form underlying interactions (e.g., Kogut & Walker, 2001). Similarly, the network perspective has made innovative use of correspondence analysis to portray the underlying structure of two types of entities in the same two-dimensional space. Thus, the relative closeness of Supreme Court justices' voting records can be depicted together with the closeness of a range of issues, such as "crime" (Breiger, 2000). In structural configuration research, structural form consists of those emergent characteristics, such as density, that affect all the actors and the dynamics within the system. In actor centrality research, structural form can be much more localized in terms of the pattern of closed or open ties surrounding the individual actor (Burt, 1992).

These four principles arguably represent the emerging hard core of organizational network research—the center from which the search for new phenomena and the development of new hypotheses proceed.[6] These principles help de-fine the boundary of network research, even though they say nothing about the level of analysis: the hard core is level free in that it applies equally to networks of individuals and networks of organizations (see Contractor, Wasserman, & Faust, 2006, for a treatment of network research across levels of analysis). Irrespective of which unit of analysis is adopted, it is the structure of relations that should be the focus of organizational network research. The negative heuristic of the program "forbids" researchers to question the primacy given to the study of social relations, for example (cf. Lakatos, 1970: 133). Studies that fail to incorporate structural thinking and analysis are outside the boundary of network research, even though the term *network* may be used in these studies. The analysis of specific connections among actors is a critical element for network research and cannot be replaced by, for example, psychometric measures without violating hard-core principles.

The impressive advances of social network research notwithstanding, existing approaches offer considerable room for developing new theory concerning how actors and networks mutually constitute each other (Parkhe et al., 2006). Both structural configuration and actor centrality research feature underpsychologized actors, and existing theory tends to replicate the dilemmas of under- and oversocialization that social network approaches were supposedly designed to overcome (cf. Granovetter, 1985). Much recent structural configuration work involves a search for universal structural patterns across networks as diverse as citation networks, neural networks, electronic circuits, and the worldwide web (see Dorogovtsev & Mendes, 2003, for a summary). Given this broad scope, actors tend to be represented as pawns subject to system forces, and there is an understandable neglect of actor cognitions.

Actor centrality research, in contrast, under the dominance of the structural hole approach, emphasizes an intendedly rational player able to calculate outcomes for personal advantage,

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[6] Comparing these ideas with the only other (brief) attempt we have found to specify the characteristics that provide social network research with its intellectual unity, we see that the previous effort (Wellman, 1988: 20), although compatible with our own, focuses more on the analytical testing of data than the articulation of guiding ideas. That previous summary emphasizes structural constraints on behavior, the importance of analyzing relations, the importance of considering patterns of relations rather than just dyadic interactions, the importance of considering how networks are included within other networks, and the creation of distinctive analytical methods. In these earlier principles we can see echoes of our own emphases on structure, relations, and embeddedness, but also an absence of emphasis on the social utility of network ties—an emphasis that has emerged strongly in organizational network research and that clearly fits our notion of a guiding idea rather than an operationalized construct.

but a player deliberately stripped of psychological depth and sociological gravitas (Burt, 1992: 4). Actors are assumed to be able to "know about, take part in, and exercise control over more rewarding opportunities" (Burt, 1992: 2, but see Burt, 2005: 22–23, for a more recent acknowledgment of the relative lack of accuracy with which many actors perceive connections among their immediate contacts). The accurate perception of second-order links, those that reach beyond an actor's own immediate social circle, is likely to be a particularly challenging cognitive task, given the relatively large number of such links. But it is the second-order links that can crucially affect important outcomes, such as performance (Echols & Tsai, 2005) and survival of organizations (Uzzi, 1996).

Note that the importance of friendship, advice, and communication networks among individual organizational leaders (emphasized in strategy research, such as in McDonald & Westphal, 2003) extends the reach of our emphasis on interpersonal networks and cognitions of networks to the interorganizational level, to the extent that organizations are considered to be represented by the upper echelon of leaders (Hambrick & Mason, 1984). Actor centrality research, in its emphasis on the strategic manipulation of ties, faces two challenges: the interpersonal ties that CEOs and other individuals are expected to rearrange for maximum advantage are difficult to perceive accurately, and crucial second-order ties are beyond their reach.

REBUILDING THE SHIP

> We are like sailors who have to rebuild their ship on the open sea, without ever being able to dismantle it in dry-dock and reconstruct it from the best components (Otto Neurath on theory building; quoted in Honderich, 1995: 97).

Otto Neurath's prescient boat metaphor captures the challenges and limitations of theory construction. There is no solid foundation of "facts" on which theory can be constructed, despite the early claims of the logical positivists (e.g., Ayer, 1936; see Popper, 1959, for the standard refutation of foundationalist approaches, and Chalmers, 1999, for a review). Theoretical terms in science can be irreducible to empirical verification—no one has observed a utility function or a quantity of social capital. To the extent that core beliefs constitute a coherent world

view, these beliefs mutually support each other like the planks of a ship. Further, the task of reconstructing theory occurs step by step; there can be no complete dismantling of the ship at sea. Contrary to the claims of Thomas Kuhn (1962), theory reconstruction does not have to wait for a scientific revolution—the sinking of the ship—nor does science have to focus on puzzle solving within a taken-for-granted paradigm without any challenge to existing theory— putting up with a leaking boat. We take the Lakatosian view that theory reconstruction, in the form of ongoing articulation of protective belt ideas, is a continuous process vital to the health of a progressive research program; the ship can be repaired on the high seas. This is a bold undertaking, given that it challenges existing verities and charts new directions.

Why do we need new directions for social network research on organizations? From a Lakatosian perspective, a progressive research program constantly draws from core ideas to articulate new understandings, reusing and dismantling, as appropriate, existing articulations. Building on the strengths of existing network research, we articulate new thinking concerning the ongoing mutual constitution of complexity and distinctiveness of both networks and actors. Our theoretical belt contribution—focused on the dynamic stability of social networks—is intended, in the spirit of Lakatos (1970), to contribute to the competitive market for ideas, rather than to establish a Kuhnian hegemony.

Networks in which people (as organizational members or as representatives of organizations) constitute the nodes are unusual in that each node is itself a complex adaptive system. The nodes are constituted in part through their relationships with others in the network, but they also bring to any particular network idiosyncratic network expectations and perceptions. Thus, network stability and change involve both the patterns of interactions within the overall network system and the idiosyncrasies of the network actors in terms of their cognitions of and expectations concerning the social network.

Therefore, there is a sense in which existing approaches neglect the extent to which social networks as complex systems are constituted by and help constitute the complexity of the nodes making up the system. It is this recursiveness between complex nodes linked together in complex systems that the dynamic stability ap-

proach focuses on. The realism of the dynamic stability approach includes a recognition that the actual state of the world is reflected in, constituted by, and sometimes discrepant with the perceptions of individuals and that both actual network patterns and perceived patterns can be approached in terms of underlying structures (see the discussion in Baert, 1998).

We suggest that organizational network research could move forward by incorporating actors' memories and desires, their bounded rationality and structural biases, and their creation and re-creation of structures of dynamic stability that they may only partially understand. (See Cilliers [1998] for a description of complex systems relevant to our approach in this paper.) We offer specific ideas concerning the interplay between actor complexity and system complexity, including how individuals' cognitions of networks reflect not just the current state of the network but also ghost ties—that is, memories of actors who are no longer physically present; the ways in which actors heuristically seek to reduce the complexity of network cognitions—for example, by organizing perceptions to emphasize clusters of people connected by short paths; and the ways in which individual disposition relates to the embeddedness of the individual in personal, organizational, and extraorganizational networks.

Organizational networks change constantly in some respects and yet can remain stable in other respects, just as organizations can be considered both rapidly changing engines of creativity (Burns & Stalker, 1961) and stable bundles of routines (Nelson & Winter, 1982). It is this change and stability that we capture with the dynamic stability label. We emphasize the tension between stability and change across levels, from the perceptual up to the whole network system. At the perceptual level, perceptions of network structures evolve as individuals learn to perceive structural holes and other unusual features of the interpersonal landscape. Perceptions tend to be stable given that people rely on default schemas such as the expectation that the two friends of an individual will themselves be friends (Krackhardt & Kilduff, 1999). However, people can learn to change their perceptions to include new types of schematic knowledge, such as the expectation that friendship networks will exhibit surprising gaps (Janacik & Larrick, 2005). Differences in perceptions can

lead to differences in how people try to change the network (Janacik & Larrick, 2005). Small changes of network relations at the local level— one individual adding a single friendship tie, for example—can have global implications for change for the whole network—by bringing disconnected clusters of people much closer together, for instance.

Conventional wisdom suggests that networks tend to be relatively stable, but this apparent stability can mask many types of change. For example, reciprocated relationships among strangers brought together in a college dormitory tend to stabilize over a period of about three weeks (Newcomb, 1961). But a closer examination of these data suggests that "reciprocity never converges in any meaningful sense, but instead fluctuates substantially over the entire observation period" of fifteen weeks (Moody, McFarland, & Bender-deMoll, 2005: 1227). Some actors form stable relations, but others "dance between friends throughout the observation period" (Moody, McFarland, & Bender-deMoll, 2005: 1229). It is this combination of stability and change that, we suggest, organizational network research can investigate. (For a related analysis, see Doreian, Kapuscinski, Krackhardt, and Szczypula [1997].)

Actors build from the stability of networks to incorporate network change. At the organizational level, actors tend to create stable relationships with trusted partners, and these stable ties accumulate, over time, into a network that provides network members valuable information about future alliance partners (Gulati & Gargiulo, 1999; Tsai, 2000). Organizational leaders recommend to one trusted partner the formation of a business relationship with another trusted partner, thus creating a three-member clique (Larson, 1992; Uzzi, 1996).

Shocks to the system of network relations can rupture this routine creation and re-creation of stable systems of relationships and can provide opportunities for actors to restructure their ties. External shocks can include new technology (e.g., Barley, 1986) and industrial action (e.g., Meyer, 1982), whereas internal shocks can include new management (e.g., Burt & Ronchi, 1990). We assume that actors try to assess the extent to which prevailing systems of relations are empowering in terms of furthering their goals. Actors within the network can deliberately try to change patterns of relationships in

order to accomplish goals that are resisted by others in the network (e.g., Kapferer, 1972). Thus, our overall emphasis on dynamic stability incorporates both a dynamic element of change and an emphasis on the creation and re-creation of relational patterns as necessary for the empowerment of individuals and the emergence of agency (cf. Giddens, 1984).

The complexity of individuals is immense, with the human brain commonly understood to be the most complex object in the universe. Social networks of relations are also complex; even a small social network of 50 individuals on one dimension such as friendship involves the presence or absence of 2,450 ties. Further, each individual is distinctive in terms of social attributes, personality, and membership in associations, whereas each network, comprising the interactions of individuals, is distinctive in terms of size, dynamics, and structural attributes. Network researchers are beginning to recognize that, to understand network evolution, we need to understand how network member attributes—both demographic and psychological—contribute to the emergence of network structure (e.g., Leenders, 1997; see Leinhardt, 1977: xiii, for an earlier call to consider "how the qualities of the individuals influence the arrangement" of network ties). We suggest that organizational network research can advance by seeking to capture the complexity and distinctiveness of both individuals and social networks in terms of mutual constitution and change.

Structuration theory, as a general approach to social issues involving agents and systems, has sensitized researchers to the duality of social structure—the ways in which knowledgeable agents draw on rules and resources in constituting and reconstituting the social structures that both enable and constrain (Giddens, 1984). The dynamic stability approach incorporates this duality in terms of boundedly rational actors creating and re-creating the social structures within which their opportunities and constraints evolve. Thus, the approach incorporates key insights from centrality research, in terms of recognizing the role of brokers in the constant creation of social structure (Burt, 2002). There is also recognition of the system properties of networks as nonreducible to the properties or the motivations of individuals. As Karl Marx observed, "Human beings make their own history, but not

in circumstances of their own choosing" (1963: 15). The structures that evolve from the interactions of individuals take on system-specific characteristics (Barley, 1986) in terms of centralization and density, for example.

The dynamic stability perspective emphasizes, therefore, the structuration of organizational networks over time by knowledgeable, but boundedly rational, actors—an idea that emerges from pioneering social network research (Kapferer, 1972) and is consistent with social theory (Giddens, 1984). We suggest that organizational network research can enhance the structuration approach by investigating the dynamic interplay between the psychology of individuals and the complexity of social networks within which they interact, and by investigating how perceived and actual network systems mutually constitute each other.

A dynamic stability perspective, although recognizing that external and internal shocks disrupt network relations, emphasizes the routine nature of internally induced change. Networks are constituted in the minds of individuals as memories, thoughts, and desires. Network change can be traced in the changing perceptions of individuals concerning the creation and disappearance of ties between actors. Networks undergo constant change as actors repel and attract each other, like components in a magnetic field (Barnard, 1938: 75). Routine change therefore tends to be analog rather than digital; that is, the network changes all the time in different places, rather than routinely shifting from one steady state to another. Locally shared systems of meaning are created when friendship groups form. The stability of such friendship groups depends on the continual efforts by members to engage in a mutual adjustment concerning how the world is perceived (Krackhardt & Kilduff, 1990).

The Lakatosian approach itself is one of dynamic stability in emphasizing the relative endurance of core ideas, together with the dynamism of progressive theory development from those ideas. Beyond the overall research directions we have sketched above, we draw specific theoretical insights and associated research ideas from considering how the four core concepts can be articulated. In the spirit of Lakatos (1970), we offer emergent protective belt theory and research directions around relational ties, embeddedness, the social utility of connections,

and structural patterning. The goal is not to delineate small puzzles whose outcomes are already predetermined (as advocated from a paradigm perspective on scientific progress; Kuhn, 1962) but to signal bold ideas concerning phenomena unanticipated by conventional wisdom.

Dynamic Stability of Relations

Our main extension is to consider how "ghost" connections to vanished partners and colleagues affect relational ties. The dynamic stability perspective leads us to consider social networks as sets of interlinked actors continually forming and reforming—continually in the process of becoming. Social networks, as outcomes of human agency, carry with them in the cognitions of their members memories of their past states, as well as hopes of their future states (Emirbayer & Mische, 1998: 963). At the level of the individual actors, the social network includes absent actors, in the form of their memories in the minds of actors currently present in the network. Like the legendary Japanese soldier who retained his organizational loyalty during decades of hiding in the Philippine jungle, organizations survive in the memories and purposes of their actors. Some organizations process people through their cultures and then return them to the external world. Examples include universities and military organizations. We suggest that organizational network research can incorporate a focus on the neglected phenomenon of the influence of exiles on the organizations they have left behind.

Thus, the tension between stability and change is affected by connections (both cognitive and actual) to absent nodes that continue as an active force within the network. People who remain in the organization selectively remember the history of who was in which office, who used to say what at meetings, and who could be relied on to help when times were difficult. Similarly, the continuing activities of some of those no longer formally part of the current network continue to be important to the network. Prominent exiles continue to influence the network from afar, through their examples of what can be achieved by network members. Their successes are envied, their failures are commented on, and their ups and downs serve as important social comparison indicators. The network may be considered a virtual set of nodes that stretches both backward in time and forward to include those anticipated to join, and that is dispersed spatially to include those whose continuing histories are vividly present (as exiles) even though formally they have no official links. When a person leaves an organization, this signals the appropriateness of exit for all those individuals who play similar roles in the social network (cf. Krackhardt & Porter, 1986). These signals affect not just interpersonal relations but also interorganizational networks. One recent example, in the realm of intercollegiate athletics, involved three members of the Big East athletic network who successfully yielded to the temptation to switch allegiance to the Atlantic Coast Conference (Spirer, 2003).

The social network, therefore, exists as layer upon layer of relations, built up over time and space in the cognitions of members. The past, for some members, may be more vivid than the present. Old-timers may wander the halls carrying on imaginary conversations with colleagues long departed (e.g., Berendt, 1994). Relative newcomers may mourn the departure of high-flying friends to other organizations and may benchmark their own ideas and progress against those of people with whom they rarely share a conversation. Current members of governing coalitions in organizations are likely to be influenced by those temporarily out of power. Deal makers may operate behind the scenes to influence appointments and policies. For each individual in the network, its reach may be idiosyncratically defined, shaped by memory and desire, reaching outside the set of obvious colleagues to include those forgotten by others.

Brown and Humphreys (2002), in an organizational example of the importance of nostalgia for vanished times, discuss the case of a university faculty who mourned the vanished past in which standards were higher, purposes were clearer, and cohesion in the network of faculty and students was greater. Such nostalgia can constitute a powerful integrating narrative of resistance to change and can propel actors to organize against apparently overwhelming forces for modernization (Welcomer, Gioia, & Kilduff, 2000). Nostalgia provides a framework for interpreting knowledge flows—a framework that may differ sharply from other sensemaking recipes.

Our emphasis here, then, is that apparent stability masks continual adjustment and negotia-

tion. The core concept of the primacy of relations must be understood to include virtual actors whose "ghost" ties may constrain and enable network member actions (see the related discussion of how past relationships continue to affect current relationships in Moody et al., 2005). An important new research direction therefore involves a focus on how the history of the network, retained in the selective memories of its members, influences network change. We propose that, to the extent that members of the social network retain and remember ghost ties to former members of the network, this ongoing strengthening of relationships with exiles will restrict the extent to which the internal organizational network can shape cognition and behavior.

Dynamic Stability and Embeddedness

We conceive of networks as evolving through a dynamic embeddedness process that takes into account both individual network positions and system-level network change. We build on recent work showing that individuals in the same network may be embedded in idiosyncratic positions that subject them to unique constraints and opportunities.

An individual who is a member of many different cliques is potentially subject to the distinctive norms and values of all of those cliques. If the individual shares membership in many cliques with one or more other individuals, co-clique members may function as watchdogs, alert to signs that the individual is violating in one clique the norms and values important to members in one of the other cliques to which they both belong (see the work on "Simmelian ties" by Krackhardt, 1998, 1999). Building on this work, we emphasize how actors in these local structures can experience significant network change, even though their direct ties remain the same. We propose that, as friends' friends change, actors may find themselves serving as central conduits for the exchange of knowledge and other resources between distant actors to whom they are tied only indirectly. Because of changes in ties over which they have no control, their structural positions shift (see Moody et al., 2005, for a visualization of how actors' positions can change even though their own ties do not change). Changes in network ties far from the individual can, therefore, affect individual out-

comes in ways not currently incorporated in research emphasizing the importance of the direct ties of actors.

Individuals are likely to differ in their ability to notice and respond to these changes in embeddedness in the larger social environment. Some individuals (high self-monitors) are acutely aware of and responsive to the modulations of the interlinked system that creates the roles they are able to play (Snyder, 1987). These individuals scan the system for cues as to how to behave in ways familiar to sociological thinking concerning the responsiveness of individuals to the ideas and attributes of their associates (Kilduff, 1992). Other individuals (low self-monitors) look to a subset of the system for support for the roles they have decided to play—roles that may or may not find support or encouragement in the larger system where ideas and actions are traded and careers are traversed (Kilduff & Day, 1994; Mehra, Kilduff, & Brass, 2001). We propose that low self-monitors, relative to high self-monitors, are likely to be more embedded in social networks in terms of transitivity (their acquaintances will tend to be mutual acquaintances of each other), betweenness centrality (they will tend to be less likely to bridge between disconnected people within the organization), and diversity of ties outside the organization (their external ties will tend to be concentrated on a group of similar people). A fruitful research direction involves investigating how self-monitoring orientation contributes to the ongoing re-creation of the network system of constraint and facilitation.

The dynamic stability perspective places emphasis on change and stability in the perception of networks. Each actor, occupying a distinctly different position in the network, possesses a cognitive map of all the connections between all of the actors in the network (Krackhardt, 1987). Each actor sees the network differently. Thus, if the perspectives of all the different actors in a forty-eight-person network are collected, it may appear that there are forty-eight different networks. Some of these cognitive maps are more accurate than other maps. Accuracy refers to the degree to which an actor's cognitive map of ties overlaps with a consensus map, a topic that has received attention in the literature (e.g., Krackhardt, 1990). Some actors will have only confused perceptions of the quality of relationships between network members, whereas other ac-

tors will be able to describe such relationships with great clarity in terms of their strength, frequency, existence of mutual admiration, and so on. Accuracy of perceptions of networks is likely to predict the skill with which actors engage in social interaction

Occupants of the same social space may anticipate very different versions of the social network to which they both belong. Actors, embedded cognitively in their own perceptions of social networks and drawing from their biased perceptions of social ties, may, we suggest, attempt to enact idiosyncratic structures of constraint and opportunity at the local level. Changes to local level structures can drastically affect global properties of networks (Robins, Pattison, & Woolcock, 2005).

Meanings and other resource flows may tend to move through rather narrow conduits that can compress, distort, or exclude important parts of knowledge. We know that certain types of network connections can handle richer streams of knowledge than other types (Hansen, 1999; Tsai, 2002). But there is little research on how the embeddedness of individual actors can interrupt or supplement flows of knowledge across networks. We suggest that actors embedded in relatively open structures, with ties to several clusters, may become experienced facilitators of new knowledge flows, whereas actors in relatively closed structures may block incoming knowledge flows discrepant with taken-for-granted assumptions. Further, we think it likely that certain signals, because of the asymmetric nature of network ties, may fail to be amplified above the threshold necessary to move beyond a certain status level in the organizational network. There is a rich set of research opportunities relating to how embeddedness restricts or facilitates rumor transmission (see Burt, 2001, for one review) and how such transmission across asymmetric boundaries in organizations alters social network structures.

To summarize, changes in the larger context within which local networks are embedded can affect flows of knowledge and other resources through those local clusters (within which ties may remain stable). The extent to which people can track changes in such global and local connections is likely to correlate with self-monitoring orientation, and is also likely to promote purposive social action. Actors who change ties at the local level may affect overall network functioning by, for example, bridging across clusters of hitherto isolated actors.

Dynamic Stability and the Social Utility of Network Connections

In this section we focus on how perceptions of centrality and centralization affect the utility of network connections. There are two questions here, one related to how actors perceive themselves and the other to how actors are perceived by others.

People tend to overestimate the number of friends they actually have in organizations (Kumbasar, Romney, & Batchelder, 1994) and, therefore, may anticipate that they have more social capital to support initiatives than they actually do. The extent of this popularity illusion is likely to differ across individuals, perhaps as a function of self-monitoring orientation, given the greater social acuity of high self-monitors (Berscheid, Graziano, Monson, & Dermer, 1976; Hosch, Leippe, Marchioni, & Cooper, 1984; Jones & Baumeister, 1976). There may be penalties attached to miscalculating the extent of personal popularity in organizational contexts where, for example, people jockey for support for leadership positions. A chairperson of a department who miscalculates how much support exists for the renewal of his or her tenure may suffer a damaging blow if the majority of the department members vote for nonrenewal. The illusion of popularity, however, may facilitate a self-fulfilling prophecy: those who think others like them may reciprocate this perceived liking, and thereby create the very friendship links that initially did not exist.

To the extent that actors in a network are connected, each actor is exposed to perceptions from both proximate and distant actors. Perceptions concerning network structures (such as who is connected to whom) are an important aspect of the shared knowledge in the minds of organizational members that constitutes organizational culture (Krackhardt & Kilduff, 2002). We suspect that slight initial differences with respect to perceptions of popularity may be transmitted to different parts of the network and can lead to accumulating advantages in actual networks (cf. the "popularity is attractive" principle; Dorogovtsev & Mendes, 2003). Social networks may take on different social capital char-

acteristics depending on the characteristics of the central actors that emerge from this process.

Order—as represented by the emergence of consensus concerning who is central in the network—is possible because each actor's perceptions are appraised in the eyes of proximate actors. As Adam Smith famously observed, "The countenance and behavior of those [we live] with . . . is the only looking glass by which we can, in some measure, with the eyes of other people, scrutinize the propriety of our conduct" (quoted in Bryson, 1945: 161). Thus, perceptions and behavior are subject to the scrutiny and appraisal of neighboring actors, whose perceptions also flow through the network, establishing reputations through a collective process of all the actors in the network (Kilduff & Krackhardt, 1994).

As part of this system by which centralization emerges, there may be a tendency to perceive popular actors as even more popular than they really are. Given that humans, as "cognitive misers," tend to simplify complex social network information (Krackhardt & Kilduff, 1999), people may tend to perceive networks as dominated by a few central actors, rather than spend the cognitive energy to keep track of the fine gradations of popularity. If there is a tendency to cognitively enhance the popularity of central actors, this attributional bias is likely to affect important outcomes, including the extent to which people are perceived to be performing well in their jobs (Kilduff & Krackhardt, 1994). Further, it is possible that a misattribution of popularity can enhance the possibility the actor actually will become popular. For example, a researcher whose work is assumed to be highly cited is likely to receive more citations, thus propelling the researcher farther into the center of the relevant citation network.

On the negative side of the ledger, it is possible that being falsely perceived as connected to many others may increase others' expectations concerning that actor's performance. Higher standards may be applied to those perceived to be part of a central elite. These issues may take on particular salience when the network is perceived as centralized around a few central actors. Those who perceive themselves to be on the margins may self-select not to attempt to pursue options that appear to be controlled by a self-perpetuating elite.

Of course, the question of who is central and who is marginal is affected by the structural configuration of the network itself, as well as by the type of centrality being discussed. An individual who is influential within one part of the social structure may be revealed as relatively marginal in the larger context of the whole social system. Conversely, people perceived by local group members to be insignificant may, like Swann in Proust's (2003) masterpiece, maintain close connections with (absent) kings and princes. Further, an actor who is popular may be less influential than an actor with fewer ties who bridges between disconnected others (Brass, 1992). The meaning and relevance of network ties are likely to vary from one social context to another, even when the structural form is identical (Gould & Fernandez, 1989).

Perceptions of centrality and of centralization are, therefore, fluid interpretations subject to change, depending on social context. Given the well-known asymmetry of relations within organizational networks, central players, relative to less central players, are likely to be able to communicate their own reputational messages with high fidelity. Thus, network flows are likely to be nonlinear. Most actors will be able to initiate relatively inconsequential network flows, but a few actors will be able to exploit the clustering and connectivity of the network to influence a large proportion of the network members.

Dynamic Stability and Structural Patterning

One of our hopes for the dynamic stability approach is that it can investigate how perceptual and actual structures of networks recursively constitute each other. We provide one avenue for such investigation in our discussion of the possibility of the cognitive small-world schema.

The small-world effect (Watts, 1999), originally investigated in the 1960s (Milgram, 1967), has grown into a dominant force in structural configuration research (e.g., Kogut & Walker, 2001; Uzzi & Spiro, 2005). A small-world network structure is unusual in that the network exhibits two network characteristics—high local clustering and short average paths—that are normally divergent (Watts & Strogatz, 1998). Local clustering means that actors in the network tend to be linked in several clusters, whereas short average path length means that any actor in the

network has a good chance of reaching any other actor through a small number of intermediaries. Thus, the hub-and-spoke U.S. airline system is an example of a small-world network, whereas the interstate highway system is not.

There are many questions yet unasked concerning small worlds that could be opened up from a dynamic stability perspective. Structural configuration researchers neglect the question of how actors discover the shortest paths connecting them to others in organizational small-world networks. For individual actors, the discovery of short paths is critical to their occupation of and exploitation of strategically central positions. But such discovery may prove difficult, because network paths are properties of the whole global network system, whereas actors are likely to have information heavily biased toward their own local network position (Watts, 2003). Actors who already occupy central positions may have advantages in terms of gaining diverse information about the structure of the network through short paths. Actors may gain these central positions in part through small initial advantages that translate into accumulating network ties as the network changes and grows over time.

From this perspective, growing networks tend to produce a surprisingly robust topology, with distinct regions (see Simon's [1996] work on the evolutionary advantages of decomposable complex systems). Such self-organized networks may prove highly resilient to disruption and highly efficient in the transmission of information across large distances. Research questions might include the following. What is the effect of differences in early structuring on the likelihood that small worlds will emerge in particular organizational arenas? What are the consequences, in terms of the social utility at the system level, of differing network structures?

One fruitful arena for the investigation of this latter question from a dynamic stability perspective can be the relatively neglected area of network cognition. There has long been interest in the topology of human cognition (e.g., Lewin, 1936). We know that each individual in an organization has a cognitive map of the relations between all individuals (cf. Krackhardt, 1990). To what extent does the system of cognitions concerning network relations tend to organize according to small-world principles? Both organizing and keeping track of organizational

relationships are likely to be especially challenging for such difficult-to-discern relationships as friendship. We propose that boundedly rational people keep track of friendship relations in organizational settings by using a simple set of cognitive small-world rules that can be summarized as follows: arrange people in dense clusters and connect the clusters with short paths. The small-world schema can, we argue, facilitate the system-wide organization of perceptions and can reduce the cognitive burden of trying to keep track of hundreds of discrete relationships.

Each person within a network might exhibit a different level of reliance on small-world perceptual organization with respect to network perceptions. Of course, researchers could compare individuals' perceptions with actual maps of the "real" relations existing between actors. But it may be possible to discover benefits to individuals, irrespective of accuracy, consequent upon the organization of perceptions according to small-world principles. Potential research questions could be as follows. To what extent does the organization of individuals' cognitive maps in terms of small worlds facilitate sensemaking and action by the individuals? Are there cognitive biases evident in the way people organize their perceptions in terms of small-world structures, and, if so, what are the advantages and disadvantages of such biases? Is it possible to "rewire" individuals' cognitions concerning organizational networks without damaging the efficacy of their social cognition as long as the small-world structure is preserved?

CONCLUSION

The contribution of this paper is threefold. First, our emphasis on a Lakatosian rather than a Kuhnian philosophy of science encourages critical debate concerning how the core ideas at the heart of organizational network research are articulated. There is no need to patrol the boundary of the network research paradigm to contrive consensus regarding theory development in order to establish the coherent research program called for by leading network scholars (Parkhe et al., 2006). We focus attention on progressive theory development rather than on fostering a closed community, an overemphasis on refutations, or a return to logical positivism.

A second contribution is the clear articulation of the leading ideas that drive the organizational network research program forward. By carefully delineating these concepts, we reinforce the continuity and stability of the core ideas that permit open debate and competition between protective belt theories. As Burns and Stalker, in their organizational classic, observed, it is the very strength of the common culture of shared ideas that allows the diversity of viewpoints and creativity from which innovation flows (1961: 119). In order for network research to engage with other prominent perspectives in management (as called for by Parkhe et al., 2006) on equal terms, the core ideas at the heart of network research need to be distinguished.

Third, we offer our own protective belt theoretical contribution—the dynamic stability approach to organizational network research—to the competitive marketplace of social network approaches. We draw attention to the ongoing mutual constitution of complexity and distinctiveness by both networks and actors. The activities of the social actor cannot be understood except in terms of the network of relationships within which the actor is embedded, and the emergence of system-level properties cannot be understood except in terms of the relationships forged by individual actors. Actors, as complex systems themselves, bring distinctive qualities to the network that can provide initial advantages or drawbacks in the relationship-forging process. Small initial advantages can lead to long-term structural advantages for the actor, and small changes at the level of local networks surrounding particular actors can have large effects on such system-level properties as average path length. Apparent stability of networks can mask many types of change, and the network system, at any point in time, carries memories of its past states and anticipation of its future states distributed in the minds of actors.

We have offered numerous research propositions derived from this general framework relating to, among other topics, the importance of ghost ties; the likelihood that people's cognitions of networks are organized as small worlds; and the likelihood that individual dispositions predict embeddedness in personal, organizational, and extraorganizational networks. In keeping with our Lakatosian focus, we have focused attention on new theoretical directions leading to the exploration of new phenomena.

It is through systems of relationships that people are able to enact their desires, pursue their affections, and get work done. In studying the evolution of social network relationships as the reciprocally emergent and re-created outcomes of purposive action, we need to discover why network connections bypass or avoid crossing certain territories. As one organizational theorist demanded to know some years ago, we need to discover not just the effects of structural holes but the reason they exist in the first place (Salancik, 1995). What is the nature of the prohibition that prevents connections between clusters? In beginning to investigate the idiosyncrasies of social actors and the flows of meanings between them, we embark on a voyage of discovery into those undiscovered territories. With boldness in conjecture and tenacity in pursuit of fruitful ideas (Feyerabend, 1970), social network research can escape the safe harbor of paradigmatic research for the development of new theories and the discovery of previously undreamed of phenomena.

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