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The Emergence of Embedded Relations and Group Formation in Networks of Competition

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Disciplines

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The Emergence of Embedded Relations and Group Formation in Networks of Competition

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Abstract

This study examines how and when small networks of self-interested agents generate a group tie or affiliation at the network level. A group affiliation is formed when actors (a) perceive themselves as members of a group and (b) share resources with each other despite an underlying competitive structure. We apply a concept of structural cohesion to small networks of exchange and identify two dimensions of such networks that foster a group affiliation: the network-wide potential for inclusion in exchanges and the inequality of structural power. These structural properties are theorized to generate positive emotions and cognitions that promote collectively oriented behavior toward others in the exchange network, even if such behavior runs counter to individual self-interest. We theorize and test how and when such structural properties give rise to embedded social relations, thereby forging connections between micro theories of exchange and macro theories of social embeddedness.

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INTRODUCTION

We theoretically and experimentally address how small networks generate local orders from a social exchange perspective by posing the following question: how and when do small, competitive exchange networks generate relational ties that in turn lead actors to perceive and treat their network as a group? This implies the development of a group category, and such a group category involves a type of social embeddedness, that is, recognition of a shared group affiliation within which particular exchanges and relations form. This *network-to-group* process has wide applicability. For example, a set of loosely associated wineries in Oregon may come to define themselves as an informal unit, and if this occurs, phenomena such as price coordination may follow (Buccola and VanderZanden 1997). Construction contractors who both compete for contracts but also consult with each other within an industry peer network may come to develop a tie to the industry that fosters information sharing and other forms of collaboration (Zuckerman and Sgourev 2006). A set of local or regional banks may coordinate their commercial transactions with lenders such that they receive lower interest rates on loans (Uzzi 1999). Finally, an emergent group affiliation may crosscut or bridge other groupings that normally constrain interaction, as when cross-party alliances emerge in a legislature (Rosenthal 1966). In each case, network ties are the basis for a group affiliation that is perceived by the actors and that leads to collaboration or cooperation that otherwise would not occur.

One consequence of the larger network is that local or regional group affiliations may emerge from the interactions. We posit that the source of network-level group affiliations is the *structural cohesion* in the network, a structural property that binds together relations in the network and creates stronger perceived cohesion (Markovsky and Lawler 1994; Moody and

White 2003).¹ *Group affiliation* (or *group formation*) is defined in social identity terms—groups are cognitive entities that have behavioral effects (Brown 2000; Hogg 2005; Tajfel and Turner 1986). The cognitive component is that actors perceive they have a group affiliation shared with select others, meaning that they perceive themselves and others as belonging to a common social unit (Lawler, Thye, and Yoon 2008). The behavioral effect is that actors then moderate their pursuit of self-interest and treat others in their group more favorably than they would otherwise (Ellemers, Spears, and Doosje 1997; Hogg 1992; Tajfel and Turner 1986). In these terms, a group affiliation is manifest in a network to the degree that: (a) actors perceive the network as a group and (b) actors share rewards or resources with others in the network when the opportunity arises. Theoretically, this idea could apply to either small local network structures or to large, all-encompassing ones. Here we focus on small, local structures and analyze the micro-mediating mechanisms through which a group affiliation can emerge. The purpose of this article is to determine how the properties of small, local structures can serve as the foundation for network-level group affiliations. We investigate whether emotions are micro-mediating mechanisms for the emergence of such affiliations.

Emerson (1972a, 1972b, 1981) defined an exchange relation as a pattern of repeated exchange among the same actors or firms over time and used this conception to distinguish economic exchange from social exchange. For Emerson (1972a, 1972b), *economic exchange* involved actors who engage in one-shot transactions driven by the characteristics of an impersonal market or network. *Social exchange* captures more broadly the recurrent interactions

¹ In graph-theoretic terms the concept of *structural cohesion* is typically defined as the number of nodes necessary to disconnect a graph (Moody and White 2003). There are, however, a number of broad literatures that employ alternative conceptions (Doreian and Fararo 1998; Granovetter 1992; Markovsky and Lawler 1994). The distinction between ours and the standard definition is elaborated shortly.

between the same individuals as “actions contingent on rewarding reactions from others” (Blau 1964:91). Classical exchange theory sharply demarcates economic from social exchange, a theme that also appears in contemporary macrosociological theories of social embeddedness and economic transactions (e.g., Granovetter 1985; Gulati and Sytch 2007; Krippner 2001; Powell 1990). This suggests that the theoretical principles from social exchange theory may help to lay bare the micro mechanisms for how “stickiness” develops in markets at the local level, as well as how “relational commitment” emerges among contracting agents (Cook and Emerson 1984; Kollock 1994; Kyriakidou and Ozbilgin 2006; Williamson 1981). To ask how micro structures of exchange generate network-level group affiliations is analogous to asking how group-based forms of embeddedness come about and shape economic exchanges in a neoclassical market. In social constructionist terms, the network itself becomes an “objectification” or “reality” for actors (Berger and Luckmann 1966). A group affiliation involves a person-to-group relational tie distinct theoretically from person-to-person relational ties.

The relational dimension is a key point of difference between economic and sociological approaches to transactions in markets (Emerson 1981; Granovetter 1985; Krippner 2001; Powell 1990). Whereas pure economic markets promote detached, “arms-length” commercial dealings, relational ties among actors generate “sticky” and “socially embedded” transactions that often defy market logic (DiMaggio and Louch 1998; Granovetter 1985, 1992; Uzzi and Lancaster 2004; Zukin and DiMaggio 1990). Arms-length or pure market ties entail “atomized” actors who are concerned primarily with the terms of the immediate contract (Uzzi and Lancaster 2004). Embedded ties entail ongoing social relations, and importantly, these generate value beyond that received in a particular transaction. Embedded ties are interesting because they generate departures from market prices, promote the exchange of private information and trust, allow

informal governance, and reduce the monitoring costs associated with contracting. Uzzi and Lancaster (2004) showed that embedded ties between corporate clients and law firms reduced the prices firms charged for complex legal services. Similarly, in a study of micro-crediting groups, Anthony (2005) found that collective goods problems are solved more effectively if members develop reciprocal ties and identify with the group. In these literatures, social embeddedness is revealed by behavior in interaction. Embeddedness emerges because the relation is more knowable or predictable, transaction costs are reduced, and emergent norms help to coordinate expectations and behavior. We seek to understand the emotional and perceptual underpinnings of such interactions by specifying and testing alternative micro-mediating pathways to embeddedness and by framing the general question in network to group terms.

Network-to-group transformations involve fundamental sociological processes, including, in particular, emergent definitions of self and other as having a common or shared group affiliation. The question of whether networks become groups was originally posed (but not investigated) by Emerson (1972a, 1972b, 1981), who drew a sharp distinction between networks and groups. He argued that exchange networks are based on structural interdependencies and relative power, whereas groups are based on coordination norms and collective action. Perhaps because of this framing, the network-to-group question posed here has not been an explicit issue on the agenda for contemporary exchange theorists. Macro work on social embeddedness tends to search for relational ties that create departures from market predictions (Granovetter 1985; Powell 1990), thereby focusing on the effects of social embeddedness instead of how it emerges. We theorize that distinct structural configurations have differential potential for network-to-group transformations and that dyadic-level transactions determine whether this network-level potential is actualized. The next section offers a multi-level framework to address this process.

THEORY

Our theory links (a) structural cohesion; (b) relational-level processes such as exchanges, emotions, and uncertainty reduction; and (c) emergent group affiliations and group-oriented behavior. The theory begins with a local structure that varies in structural cohesion and establishes opportunities and incentives for exchange. In these contexts, actors make choices about exchange partners, and over time, their repeated choices yield actualized exchange relations. Whereas network exchange theories stop at the point of making predictions for power exercise or exchange frequency (Markovsky et al. 1993; Skvoretz and Lovaglia 1995; Wilier 1999), our work here is the first in this tradition to examine how the network itself can have effects on how actors view the network as a group and how they behave toward its members.

We interweave two theories in order to address different parts of this multi-level problem. *Exchange network theories* (Cook and Emerson 1978; Cook et al. 1983; Markovsky et al. 1993; Markovsky, Wilier, and Patton 1988) are the backdrop for our concept of structural cohesion. We use these to theorize how the structural cohesion of the network produces patterns of exchange frequency among actors. *Relational cohesion theory* (Lawler, Thye, and Yoon 2000; Lawler and Yoon 1996; Thye, Yoon, and Lawler 2002) elucidates how frequent exchange produces cohesive exchange relations and identifies the role of emotions and cognitions in the development of relational ties. *Positive affect* and *uncertainty reduction* are key mediating mechanisms for these effects (Lawler et al. 2000). Group formation is manifest to the degree that (a) actors *perceive a group affiliation* with others in the network and (b) they *share resources with others* in the network. The latter involves allocating resources to others in the network when individuals have a pool of profits and full discretion to keep or share whatever one chooses,

namely, a “dictator game” in economic terms (Guth and Huck 1997; Roth 1995). This measure is conceptually identical to the allocation task used in social identity research as an indicator of group formation (Tajfel and Turner 1986).

Our theory specifically connects two dimensions of structural cohesion to dual mediating mechanisms and subsequently, to dual manifestations of group formation. The complete theoretical model is portrayed in Figure 1. The two structural dimensions—the power in the network and the likelihood of inclusion—generate observed exchange frequencies for actors in the network (Markovsky et al. 1993; Wilier 1999). Frequent exchange is known to generate positive feelings and increase the predictability of others’ behavior. The result is a greater sense of unity and perceived relational cohesion at the dyadic level (Cook and Emerson 1984; Kollock 1994, 1999; Lawler et al. 2000, 2006; Lawler and Yoon 1996). Frequent exchange or shared interaction should enhance the overall sense of common experience with others in the network, a condition known to foster group formation (Brown and Wade 1987; Collins 1981, 2004). The following sections elaborate the theoretical reasoning underlying this model.

The theory applies to the following kinds of encounters, which paradoxically would normally militate against group formation at the network level. First, the theory assumes an exchange network, tying together three or more actors who derive individual benefit from interaction (Cook and Emerson 1978; Markovsky et al. 1988; Wilier 1999). The task is to exchange in a way that promotes self-interest, and therefore, one’s attention is on maximizing self benefit and not on the network as a unit. The nodes in the network can represent individual or corporate actors. Second, the exchanges are explicitly negotiated in form. Negotiated exchange is more impersonal; there is no explicit value from reciprocity; and conflict among the parties tends to be more salient (Molm 1994, 2003a, 2003b). Third, the relations of the network

are competitive in that each actor can exchange with only one other at a given time so exchange partners may be scarce (Emerson 1981; Wilier 1999).² This property injects opposition into the network that makes self-interest, rivalry, and exclusion salient. Fourth, the network itself does not mediate rewards or profits for the actors since there are no collective rewards produced by the network. Fifth, the individuals are essentially strangers with no prior history of interaction. Finally, the actors have no preexisting relations with the others; they know only the number of actors and the shape of the network. The following sections use principles from network exchange and relational cohesion theories to explain how and when structural cohesion produces cognitive and behavioral group formation under these less than ideal conditions. Our analysis centers on the micro-mediating mechanisms of exchange.

Insert Figure 1 Here

Power, Networks, and Structural Cohesion

Network exchange theory was developed to explain power gradients and resource distributions in networks (Bonacich and Bienenstock 1993; Markovsky and Lawler 1988; Molm, Peterson, and Takahashi 1999; Stolte and Emerson 1977; Wilier 1999). *Power* is defined as a structural capability that promotes unequal resource distributions favoring some actors at the expense of others (Thye 2000b; Wilier 1999). The capacity to include or exclude those others,

² In the traditional parlance of exchange theory, these are exclusively (Wilier 1999) or negatively connected (Emerson 1981) relations. Real-world examples include powerful auto manufacturers who seek exchange with only one supplier to the exclusion of others.

based on network structure or asymmetric dependencies, is central to network exchange theory.³ The theory identifies three distinct types of network structures illustrated in Figure 2 (Girard and Borch 2002; Markovsky et al. 1988, 1993). *Equal power* networks are those in which each position is structurally isomorphic (Borgatti and Everett 1992) or structurally equivalent (Burt 1983; Mizuchi 1990). Here, all positions have the same opportunity for exchange, and such networks tend to promote equal profit allocations. *Strong power* networks are those in which the high power positions have more alternative partners than exchanges they can complete (Simpson and Wilier 1999). In these networks, some of the low power actors are always excluded in each transaction, which creates a “bidding war” among low power actors that favors the high power actors (Thye, Lovaglia, and Markovsky 1997). This is comparable to Simmel’s (1950) *Tertius Gaudens*, and the result is high levels of profit differentiation favoring the advantaged actors. In contrast, *weak power* structures are those in which no position is necessarily excluded from exchange, but the likelihood of inclusion varies across positions. To illustrate, Figure 2 shows two weak power networks with the likelihood of inclusion, $L(i)$, for each position (Markovsky et al. 1993; Skvoretz and Lovaglia 1995).⁴ We assert that with repeated exchange, actors have differential experiences in equal, strong, and weak power structures due to power differences and unequal likelihoods of inclusion. These network properties are structural in nature, comparable to

³ A complete version of this model and network exchange theory can be found in publications within the tradition (Markovsky et al. 1993; Markovsky, Wilier, and Patton 1988; Simpson and Wilier 1999) and on the Internet (Lovaglia et al. 1995). Here we provide only a brief sketch emphasizing features of direct relevance to our research.

⁴ Markovsky et al. (1993) develop a model based on probabilities of inclusion and predict that the central positions in the 4-line would receive 75 percent of the profits here, compared to maximal profit differentiation in strong power structures and no profit differentiation in equal power structures. The larger the number of opportunities for exchange over time, the closer the data will approximate these point predictions (see Markovsky et al. 1993).

measures of structural equivalence or cohesion common in the larger social networks literature (Burt 1978, 1992; Mizruchi 1990; White and Harary 2001).

Insert Figure 2 Here

Our concept of *structural cohesion* captures and incorporates two structural properties—variations in network power and the likelihood of inclusion—to predict group formation. With regard to power, compare the networks in Figure 2. The 4-full and the triangle are both equal power networks because all positions are structurally isomorphic. The 4-line is a weak power network because exclusion occurs (if the two central positions exchange) but it need not occur (when the central actors exchange with the peripherals). Finally, the 2- and 3-branch each represent strong power structures wherein (under a one exchange rule) some position at the peripheral must always be excluded. We suggest that frequent exchanges under equal power conditions will lead to (a) greater positive emotion, (b) more perceived cohesion, and (c) more of a shared or common experience with others in the network (Burt 1978; Lawler and Yoon 1996; Mizruchi 1990).

Insert Table 1 Here

The likelihood of inclusion is a distinct dimension within and across these power conditions. For example, one actor must always be excluded in the triangle but not the 4-full. The likelihood of inclusion is calculated as the average probability for each position to be

included in exchange for each given network. The value of $L(i)$ approaches 1 as every position can be included in every exchange. We suggest networks with a higher likelihood of inclusion will further enhance actors' positive emotions and sense of shared experience, a view consistent with Blau's (1977) linking of perceived cohesion and the density of within-group relations. Table 1 lists the variations in network power and network-wide likelihood of inclusion for five common networks. Structural cohesion and predicted group formation is highest in the 4-full and lowest in the 4-branch. The rationale is that equal power networks with a high likelihood of inclusion promote frequent exchange, maximal degrees of shared experience, positive emotions, and less uncertainty among the actors in those networks.

Formally, we propose that structural cohesion (SC) is a function of power (P) and the likelihood of inclusion, as shown in equation 1:

$$SC = f(P, L(i))$$

In terms of our theorizing, networks high in structural cohesion should produce high levels of shared positive emotions and lower uncertainty. In the experiment to follow, we use the five networks in Table 1 to analyze how variations in power and likelihood of inclusion produce differing degrees of group formation. Our concept of structural cohesion implies that (a) equal power networks have greater capacity to generate group formation relative to unequal power networks, as do (b) networks with a higher average likelihood of inclusion.⁵

⁵ To apply our measure of structural cohesion, one must first categorize the network as strong (S), weak (W), or equal (E) power and calculate the likelihood of inclusion (H = higher and L = lower). The theory predicts $EH > EL > WH > WL > SH > SL$.

As noted, structural cohesion traditionally has been treated as a network-based property that refers to node connectivity, and it has been defined as the number of nodes necessary to disconnect a graph (Moody and White 2003; Wasserman and Faust 1994). This definition is somewhat limited for the purposes of predicting person to group transformations—especially in the small local structures of concern here. For instance, the traditional measure of structural cohesion does not differentiate between the 3-branch and the 4- line shown in Table 1 (i.e., both have a cohesion measure = 1, as would a line of any length). Yet, an extensive literature documents that line networks differ greatly in the capacity to produce power exercise and modify the likelihood of inclusion across nodes (Lucas et al. 2001; Markovsky et al. 1988, 1993; Wilier 1999), factors known to impact emotions and perceptions of cohesion (Lawler et al. 2000; Lawler and Yoon 1996, 1998). Our measure of structural cohesion captures the propensity for small, local structures to unleash emotional and cognitive processes that allow networks to take on group-like properties.

Mechanisms: Positive Affect and Uncertainty Reduction

Extrapolating from research on the development of commitment in exchange theory, there are likely to be two mediating mechanisms for structural cohesion effects on group formation: *positive affect* (Lawler et al. 2000; Lawler and Yoon 1996, 1998) and *uncertainty reduction* (Cook and Emerson 1984; Kollock 1994, 1999). The theory of relational cohesion and related research indicates that exchange relations form and generate commitments through an

emotional/affective process (Lawler and Thye 1999; Lawler and Yoon 1996; Thye et al. 2002).⁶ Other research in the exchange tradition supports an uncertainty reduction process (Cook and Emerson 1984; Kollock 1994), treating uncertainty as an exogenous structural condition and repeated exchange as reducing that uncertainty. Incorporating both of these processes, our theory portrays the interrelationships among structural cohesion, the two intervening mechanisms, and group formation (see Figure 1).

Whereas structural cohesion is an objective network property, *relational cohesion* is subjective and based on the perceptions of actors within the network (for a similar distinction, see Bollen and Hoyle 1990 or Mizruchi 1990). Relational cohesion theory stipulates that more frequent exchange among the same actors generates positive feelings (i.e., pleasure/satisfaction), and these in turn generate perceptions of a unifying, cohesive relation. Research testing relational cohesion theory has affirmed this basic point in focal dyads and shown effects on three types of commitment behavior, namely, staying in the relation, giving unilateral gifts, and cooperating in joint ventures that pose a social dilemma (Lawler et al. 1995; Lawler and Yoon 1996, 1998).⁷ The overarching rationale for such effects is that positive emotions from exchanges are attributed to the relation and the relation takes on additional value, a point that is consistent with macro accounts of how social embeddedness produces non-market prices (Uzzi and Lancaster 2004).

⁶ The original relational cohesion theory applies to focal dyads and makes predictions for relational ties and dyadic commitment (Lawler and Yoon 1993, 1996, 1998). Later work developed an affect theory of exchange (Lawler 2001; Lawler, Thye, and Yoon 2008, 2009) that addresses how and when task jointness and shared responsibility generates micro social order in networks, groups, or organizations. None of this work addresses the unique focus of this article, how the overall *network structure* affects per-son-to-group transformations under conditions (e.g., competitive networks) where there is little or no task jointness and sense of shared responsibility at the network level.

⁷ Lawler and Yoon (1998) investigated dyadic relational cohesion within a four-person “stem” network. That work focused on dyads and does not address the network-to-group phenomenon theorized here.

Structural power is important to relational cohesion theory because that research tradition finds that the exchange-to-emotion-to-relational cohesion process is stronger in equal than in unequal power dyads, and here we extend this logic to networks.

As noted earlier, there is additional evidence that people develop commitment in exchange relations to reduce environmental uncertainty and facilitate exchange (see Cook and Emerson 1984; Kollock 1994). Kollock (1994) showed that buyers and sellers of a product develop stronger relational commitments where there is high, compared to low, uncertainty about the quality of products bought and sold in a spot market.⁸ By consistently exchanging with the same others, individuals become more familiar with each other's preferences, behavior patterns, and so forth, and this ostensibly makes the negotiations and actual exchanges more predictable. This predictability underlies and reflects the uncertainty reduction process. Importantly, uncertainty reduction also plays a role in social identity processes. Hogg and Mullin (1999) found stronger social categorization effects on group formation under conditions of high situational uncertainty and argued that uncertainty reduction is a fundamental motivation for group formation (see also Hogg and Abrams 1993). Given empirical evidence in support of both emotional/affective and uncertainty reduction processes, Lawler et al. (2000) tested and found that these are dual, parallel routes leading to commitment in social exchange and, implicitly, to group formation. Thus, positive emotions and uncertainty reduction appear to be complementary processes, and we test for both of these processes here.

⁸ In both Kollock (1994) and Cook and Emerson (1984), uncertainty is treated and manipulated as an exogenous condition. In our research, uncertainty reduction is conceived as an endogenous condition between exchange structure and group formation (see also Lawler et al. 2000).

Relation-to-Network Effects

How do exchanges in dyads within a network have an impact on group formation at the network level? We theorize that higher structural cohesion and the processes it unleashes have a cumulative effect and generate a collective sense of shared experience among actors in the network. Shared experience involves the perception that they are in the same overarching unit, face similar constraints and opportunities, experience common activity (negotiating exchanges), and share a common fate. In more structurally cohesive networks, this collective sense of shared experience should be stronger, and in the context of positive emotion and reduced uncertainty, one result is that actors come to perceive the network itself as a group. There are good theoretical reasons for positing such effects in Collins' (1981, 1989, 2004) theory of interaction ritual chains. He argues that a group membership or affiliation emerges if two or more individuals interact around a common focus and experience common moods or emotions over time. Under these conditions, actors begin to "feel like members of a little group with moral obligations to one another" (Collins 1989:18). As such, mutual positive emotions are a key mechanism linking shared activity and group formation.

Other research traditions clarify, elaborate, and further support the role of emotions. First, there is evidence from psychology and organizational behavior that positive emotions spread across persons and relations (Barsade 2002; Brief and Weiss 2002; Isen 1987). Thus, if Actor A experiences positive emotions in exchanges with B, these feelings tend to carry over to exchanges with C and vice versa. Second, positive emotions are known to generate more inclusive social categorizations, broader and more flexible perspectives, and more group-oriented behavior (Amabile et al. 2005; Ashby, Isen, and Turken 1999; Markovsky and Lawler 1994).

People experiencing positive affect are more likely to view a task or cognitive stimulus from different angles and engage in global processing that incorporates broader features of the task or situation. In short, people pay more attention to the “big picture,” which can be construed as the overall network in an exchange context (see also Gasper and Clore 2002; Lickel et al. 2000). All things being equal, positive emotions and feelings should spread across the network and enhance the salience of the network as a unit. In this way, positive feelings and perceived cohesion at the dyadic level should strengthen the collective sense of shared experience and group formation in the network.

HYPOTHESES

To summarize, the cognitive dimension of group formation is the degree that actors perceive a common group affiliation with others in the network; the behavioral dimension is the degree that an actor, if able to dictate a reward allocation, will share resources with other members of the network. The main hypotheses indicate that the dimensions of structural cohesion—the variations of network power and the likelihood of inclusion— have effects on group formation. These effects are *indirect* via intervening exchange behaviors, positive affect, uncertainty reduction, and perceived cohesion at the relational level.

Hypothesis 1: Networks higher in structural cohesion will produce higher exchange frequencies than networks lower in structural cohesion (structural cohesion proposition).

Hypothesis 2: Structural cohesion effects on network group formation are mediated by a three-step emotional/affective process (relational cohesion propositions).

Hypothesis 2a: The greater the rates of actual inclusion in exchange, the greater the positive emotions (pleasure/satisfaction) from exchanges in the network.

Hypothesis 2b: The greater the positive emotions generated by exchanges in the network, the greater the perceived relational cohesion of the exchange (dyadic) relations.

Hypothesis 2c: The greater the perceived relational cohesion of exchange dyads, the stronger the network group formation (i.e., perceived group affiliation and sharing of rewards across network actors).

Hypothesis 3: Structural cohesion effects on network group formation are mediated by a three-step uncertainty reduction process (uncertainty reduction propositions).

Hypothesis 3a: The greater the rates of actual inclusion in exchange, the greater the perceived predictability of negotiated exchanges in the network.

Hypothesis 3b: The greater the perceived predictability of negotiated exchanges, the greater the perceived relational cohesion of the exchange (dyadic) relations.

Hypothesis 3c: The greater the perceived relational cohesion of exchange dyads, the stronger the network group formation (i.e., perceived group affiliation and sharing of rewards across actors).

METHOD

Experimental Context

The experiments simulate a situation in which several organizations (companies) are in a network. Participants are told that each organization has a niche and strengths that are complementary; thus, they can benefit from working on joint projects with others in the network. In this sense, each node in the network represents a corporate actor, and the network simply defines which ties can generate jointly beneficial projects. The problem for representatives is that their interests diverge, thereby creating a bargaining problem and mixed-motive context (for an analysis of the bargaining problem, see Cook and Emerson 1978). Overall, the corporate representatives are interdependent, compete with others to secure exchange partners, and are focused on relational contracting (see Powell 1990). The experimental procedures integrate key features of experiments on relational cohesion (e.g., Lawler et al. 2000; Lawler and Yoon 1996) with those from exchange networks (Markovsky et al. 1988; Thye et al. 1997).⁹

⁹ The experiments of network exchange theory typically have been more abstract and lean in terms of providing participants with real-world content. Across both research traditions, exchanges are dyadic, agreements are binding, and structures are exogenous and fixed. The most important differences center on the bargaining process (cf. Lawler and Yoon 1993; Markovsky et al. 1988). In exchange network research, there are simultaneous offers or demands by all participants, and thus participants do not know what their potential partners are demanding at the time they make a demand. Once all participants have made a demand, agreements are determined for that transaction episode. In relational cohesion research, there are sequential offers, and participants know what potential partners have offered when they counter. These differences reflect the theoretical assumptions of exchange network theories and relational cohesion theory, respectively.

Design and Participants

The data are from experiments on the five exchange networks portrayed in Table 1. A total of 255 people participated in the experiment—45 in each three-actor network and 60 in each four-actor network. Participants were randomly assigned to each network and each position within a network. A total of 15 groups were run per network, yielding 75 groups across the entire experiment. Participants were undergraduate students at a southeastern and northeastern university who were paid for their participation. Each university collected half the overall data, and gender was counterbalanced within each condition. The dimensions of structural cohesion are the key independent variables. The five networks were chosen to reflect variation along the two dimensions of structural cohesion. There are two strong power branch structures, two equal power all-to-all structures, and one weak power structure (i.e., the 4- line). In addition, the networks also reflect variation in the likelihood of inclusion, with the fully connected four-actor being the greatest and the 4-branch being the lowest.

Experimental Procedures

Upon arrival, participants were escorted to separate cubicles and asked to read written instructions. The instructions explained that they would bargain anonymously with possible partners in the other cubicles, each representing a small private computer company, termed Alpha, Beta, Gamma, or Delta. Participants were informed that each company develops highly specialized computer chips and sells them to large computer companies. Given their complementary specialties or niches, they each could benefit by exchanging with other small

companies. Joint ventures to develop new computer products would generate profits, and their task was to negotiate the division of that profit.

The instructions explained that there would be up to 24 episodes of negotiation among the same actors. In reality, the experiment ended after the twentieth episode in order to prevent end effects. The negotiations started anew on each episode, and therefore, each episode was formally independent of previous ones. Negotiations occurred simultaneously along all viable network paths until an exchange was consummated or until time ran out. During an episode, there was competition in that actors could exchange with only one other actor in the network (or none). If an agreement was not reached in a given episode, the actor did not receive profit from a joint venture for that period. Consistent with related research and scope conditions of relational cohesion theory, each actor had information only on their own negotiations (Lawler and Yoon 1996) and on the overall shape of the larger social network (Lawler and Yoon 1998). They lacked information on the others' negotiations and the amount of profits elsewhere.

The mechanics of the negotiations integrated the offer-counteroffer sequence of relational cohesion research (Lawler and Yoon 1996) with the making of simultaneous demands on a profit pool used in network exchange theory (Markovsky et al. 1988). Following the former, we allowed multiple rounds (up to a maximum of five) of negotiation within each episode; a round is a demand by each actor for each of their relations within the network. Following the latter, there was a fixed profit pool (32 points) for each relation, and negotiations took the form of each actor *simultaneously* putting forth a claim or demand on joint profits. Each participant's task was to negotiate on behalf of their own organization's interests and to acquire as much profit as they could for their organization. Participants understood that their pay for the experiment was based on a formula that translates their cumulative point earnings for their company into money.

The negotiations took place via micro computers connected to each other. To make a claim, each participant simply indicated how many profit units (0 to 32 points) their organization wanted from each prospective partner. The demands of each actor were made simultaneously, and on any round they could repeat their last offer or make a concession by lowering their demand. Within an episode they could not retract earlier concessions, that is, raise their demand. An agreement in any dyadic relation occurred when their demands converged. Once all actors had made their claims, each person received information on the claims of connected others and the next round began.

Measures of Mediating Variables

The mediating variables specified by the theory are: exchange frequency (the rate of inclusion in exchange), positive emotions (pleasure/satisfaction and interest/ excitement), uncertainty (perceived predictability), and perceived cohesion of exchange relations. In addition, we measured profit differentiation to control for its effects. All variables were measured at the network level to circumvent data interdependencies and at temporal points that reflected their causal place in the theory (see Figure 1). Each measure is described in the following.

Exchange frequency is measured as the average number of actors that were included in exchange in the network across all episodes. This is conceptually the same as exchange frequency at the dyadic level. We tallied the number of times each actor was included in an exchange, divided this by the maximum inclusions possible, and then averaged these proportions across actors in the network. This measure captures the exchange experiences of each individual

while simultaneously controlling for the different number of exchanges possible across the five networks.

Profit differentiation is the average profit difference in consummated dyadic exchanges within a network. For each network, the profit difference for each completed dyadic exchange was aggregated and averaged at the network level. This provides an overall measure of profit differentiation at the network level.

Positive emotions were measured for each relation on a questionnaire administered after episode 16. The *measures* of pleasure/satisfaction and interest/excitement were identical to those in previous research (Lawler et al. 2000; Lawler and Yoon 1996, 1998). Participants reported their feelings about the negotiations for each relation along 9-point bipolar adjectives. For *pleasure/satisfaction*, the items were pleased-displeased, happy- unhappy, satisfied-not satisfied, contented- discontented, joyful-not joyful (Cronbach's $\alpha = .94$).¹⁰ The items for *interest / excitement* were enthusiastic-unenthusiastic, exciting-boring, energetic-tiring, motivating-unmotivating, and interesting-not interesting (Cronbach's $\alpha = .87$). Network-level scores were created by averaging the self-reported emotions for each dyad, and then averaging all such scores in the network.

Uncertainty reduction also was measured for each dyad after episode 16. These items asked participants to rate the extent that they would describe the negotiations as clear-vague, predictable- unpredictable, stable-fluctuating, and certain-uncertain (Cronbach's $\alpha = .83$). These same items were used in a recent study that observed an uncertainty reduction pathway as well as

¹⁰ For reasons outlined in Thye (2000a), the reliability estimates for this index (and subsequent indices) are calculated separately for each experimental condition. That is, reliability is estimated within each network structure and within each power condition created by the network (i.e., high, low, equal). The reliabilities reported are a weighted average of these estimates.

the posited emotional/affective pathway in a three-actor productive exchange context (Lawler et al. 2000).

Finally, *perceived dyadic cohesion* was measured for each dyad in the network after episode 16. The participants were asked to describe each relation along five bipolar adjectives with a 9-point scale: close-distant, coming together-coming apart, solid-fragile, cohesive-divisive, and converging-diverging (Cronbach's $\alpha = .89$). This measure is virtually identical to that used in prior research testing relational cohesion theory (Lawler et al. 2000; Lawler and Yoon 1996, 1998). Scores for each tie of the network were averaged across the network. Across several prior studies, confirmatory factor analyses tested the theoretical assumption that these questionnaire measures are distinct phenomena on an empirical level, and the results consistently support that assumption (see Lawler et al. 2000; Lawler and Yoon 1996, 1998).

Dependent Variables

Perceptions of group affiliation were measured on a post-questionnaire, administered at the end of episode 20 but before participants knew the experiment was over. This measure sums the responses across five bipolar questionnaire items anchored by a 9-point scale. Specifically, the items assessed the extent to which participants (a) were mutually dependent on one another, (b) in a similar situation, (c) earned similar profits, (d) belonged to the same group, and (e) felt a common bond with the others. Based on our theorizing, these items capture an emergent sense of group at the network level. A principle components factor analysis revealed that all of these items loaded positively on a single underlying dimension (eigenvalue = 2.67, $R^2 = 54$ percent) and the measure displayed good internal consistency (Cronbach's $\alpha = .77$). Also, to check on the

independence of perceived dyadic cohesion and perceived group affiliation, we conducted a confirmatory factor analysis to examine a two-factor model. The results affirm the two-factor solution (chi-square = 50.95, $df = 26$ for the one-factor model; chi-square = 86.46, $df = 27$ for the two-factor model; difference = 35.51, $df = 1$, $p < .001$). This indicates a much better fit for the two-factor model.

Resource sharing in a dictator game was measured by each actor's allocation of 100 profit points to themselves and other network members. This option was provided initially on episode 17 and recurred for the four remaining episodes. Each participant was given 100 profit points that they could allocate to themselves and others in the network. The instructions indicated that they could allocate these points in whatever manner they wished.¹¹ Because all allocations were anonymous and participants did not receive information on the profit points others allocated to them until the end of the study, individuals could not use the dictator game in a "strategic" manner. The network score for sharing recourses is simply the average proportion of points given to others (i.e., 100 minus the number kept for self). As noted earlier, this measure is conceptually identical to the reward allocation task used in social identity research (Tajfel 1978).

RESULTS

The results are organized into three sections. The first part is preliminary and involves a series of one-way ANOVAs and Tukey's honestly significant difference (HSD) follow-up tests

¹¹ Participants were told the 100 supplemental points were independent from the focal negotiations and that each supplemental point is worth only 20 percent of a profit point earned in the normal rounds.

(for the five networks) to examine the main effects of structural cohesion on exchange frequencies (Hypothesis 1), profit differences, and dimensions of group formation (group affiliation and resource sharing). The second part of the analyses uses ordinary least squares (OLS) regression to test the two sets of mediating mechanisms (Hypothesis 2: positive emotion and Hypothesis 3: uncertainty reduction). In doing so, each step of the theoretical model in Figure 1 is assessed, controlling for all antecedent variables. Finally, as an ancillary analysis, we analyze postquestionnaire data that further shed light on the network-to-group problem examined here.

Analyses of Variance

Table 2 presents the ANOVA and Tukey's HSD results and mean values for exchange frequencies, profit differences, perceived group affiliation, and resource sharing in the dictator game. The five networks in Table 2 are ordered from high to low on structural cohesion. The results for exchange frequency and profit differentiation in Table 2 reveal significant main effects for structural cohesion on both phenomena (for exchange frequency, $F_{4,70} = 61.19, p < .001$; for profit differentiation, $F_{4,70} = 17.5, p < .001$). The ordering of the means for both variables also corresponds with structural cohesion in the expected manner. As predicted in Hypothesis 1, the 4-full produced the highest levels of network-wide exchange (proportion = .85) while the triangle produced significantly lower levels of exchange frequency (proportion = .66). The proportion of .64 in the 4-line reflects a "weak power" effect due to the fact that the two central actors exchange periodically with each other (see Markovsky et al. 1993), producing one rather than two exchanges for the transaction episode. Finally, as predicted, the two strong power

networks produced the lowest proportions of network inclusion (3-branch = .60 and 4-branch = .49). The data provide clear and consistent support for the first hypothesis.

Insert Table 2 Here

The observed ordering for profit differentiation also is consistent with that predicted by network exchange theory (Markovsky et al. 1988, 1993; Wilier 1999) and corresponds with our concept of structural cohesion. As expected, strong power networks generated larger profit differences than weak or equal power networks. Overall, both sets of analyses suggest that networks higher in structural cohesion produce greater exchange frequency and more equality.

Turning to the results for group formation, the data indicate that networks higher in structural cohesion have a positive main effect on perceptions of a group affiliation ($F_{4,70} = 4.88$, $p < .001$). As expected, we observed higher levels of group affiliation in equal power networks relative to weak power networks, and weak power networks produced more group affiliation than did strong power networks. Within equal and strong power networks, we also found higher levels of group affiliation for those structures with a higher likelihood of inclusion. These findings are consistent with our theorizing. At the same time, there was no main effect for structural cohesion on sharing resources in a dictator game ($F_{4,70} = .54$, $p = ns$). However, the OLS regression analyses in the next section will show that this is due to countervailing effects of a positive indirect path (consistent with the theory) and a negative direct path (not predicted by the theory). We return to this issue shortly.

The results of the Tukey's HSD follow-up tests presented in Table 2 reveal an interesting pattern of differences among the means. These tests indicate that the exchange frequency in the

weak power 4- line (.640) does not differ significantly from that observed in the equal power triangle (.655) or the strong power 3- branch (.603). Similarly, these tests reveal that the level of group affiliation in the 4-line (4.03) is not statistically distinct from that found in the equal power triangle (4.68) or the 3-branch (4.08). Comparing across these three networks, the implication is that when equal, weak, and strong power networks produce comparable levels of exchange frequency, these networks also yield comparable levels of group affiliation. More broadly, conditions of power shape group affiliations primarily by affecting the likelihood of inclusion as it is manifest in exchange frequency.

Overall, our conception of structural cohesion—as captured by variations of network power and likelihood of inclusion—impacted exchange frequency, profit differentiation, and perceived group affiliation as we expected and consistent with our theorizing. Networks high in structural cohesion produce higher exchange frequencies, less profit differentiation, and greater perceived group affiliation. There is no evidence of a structural cohesion main effect on the sharing of resources in a dictator game, but the regression analysis to follow helps to clarify this.

Cohesion in Exchange Relations

We estimated a series of OLS regression equations to test for structural cohesion effects on mediating links specified by Hypotheses 2 and 3. The analysis separates the two components of structural cohesion as distinct: the type of power in the network and the likelihood of inclusion. Because the three kinds of power are categorically distinct, we created dummy variables that corresponded to the distinctions between equal, weak, and strong power networks

(where strong power is the omitted category). For the likelihood of inclusion, the cardinal scores for each network were the independent measure (see Table 1).¹²

Regressing exchange frequencies on each of these components reveals the expected positive effects for equal power ($b = .763, p < .001$), weak power ($b = .281, p < .01$), and the structural likelihood of inclusion ($b = .786, p < .001$). These findings affirm the first link in the Figure 2 theoretical model from the dimensions of structural cohesion to exchange frequency and are further evidence in support of Hypothesis 1.

The six testable predictions that comprise Hypothesis 2 and Hypothesis 3 posit effects from exchange frequencies to (emotion and predictability) and finally to relational cohesion. Table 3 contains the results for each link in the hypothesized process: exchange frequency to emotion and predictability (columns 1 to 3) and emotion and predictability to dyadic cohesion (column 4). Each link is discussed in turn.

Exchange frequency, emotions, and predictability. To test Hypotheses 2a and 3a, we regressed pleasure/satisfaction, interest/excitement, and perceived predictability on the measure of exchange frequency controlling for structural power. The results show significant positive effects for exchange frequency on both positive emotions—pleasure/satisfaction ($b = .447, p < .05$) and interest/excitement ($b = .478, p < .05$). In addition, there was an effect for exchange frequency on the perceived predictability of the negotiations ($b = .501, p < .05$). More frequent exchange increased both positive emotions and perceived predictability. Thus, there is consistent support for the first step of Hypotheses 2 and 3.

¹² These dimensions are not completely orthogonal and there are significant correlations between them (i.e., the zero-order correlation between equal power and likelihood of inclusion is $r = .52, p < .001$, and between weak power and likelihood of inclusion the correlation is $r = .23, p < .04$). However, there are no multicollinearity problems in the regression analysis to follow.

Perceived cohesion of exchange relation. The second step of the theorized process (Hypotheses 2b and 3b) is that higher levels of positive emotion and more predictability increase the perception that exchange relations are cohesive and unifying objects in the situation. Column 4 of Table 3 provides the relevant regression analysis and shows findings that support the hypotheses. Both positive emotions and perceived predictability enhance the degree that actors perceive their exchange relations as cohesive ($b = .382, p < .01$ for pleasure/satisfaction and $b = .312, p < .01$ for perceived predictability).¹³ There is no impact of interest/excitement on perceived cohesion; however, of the two positive emotions, interest/excitement is often the weaker predictor (Lawler et al. 2000). Overall, these effects dovetail with those observed in prior research and are consistent with our theorizing (Kollock 1994; Lawler and Yoon 1996).

Insert Table 3 Here

There are also a number of significant effects that were not predicted by our theory. First, there are positive direct effects of equal and weak power on perceived dyadic cohesion ($b = .384, p < .01$ for equal power, and $b = .354, p < .05$ for weak power). Thus, equal power and weak power (compared to strong power) networks generated more perceived dyadic cohesion independent of the mediating process. This finding does not contradict our theory, but instead suggests that the structural cohesion of the network has direct effects on perceived cohesion in dyads that are not mediated by the emotion or uncertainty pathways. Such direct effects dovetail

¹³ The partial correlation of pleasure/satisfaction and predictability is $r = .138$, controlling structural cohesion, exchange frequency, and profit differences. Correlated error, therefore, is not problematic.

with related research that distinguishes structural (objective) cohesion from realized (subjective) cohesion in groups, subgroups, or relations (e.g., Bollen and Hoyle 1990; Markovsky and Lawler 1994; Mizruchi 1990; Moody and White 2003). Second, there is a negative effect of equal power on predictability. This suggests that strong power networks were more predictable (net of the two endogenous processes), which may be due to predictability of power use by those in high power positions. This finding is clarified further in analyses presented later.

Overall, the results support the second “step” of Hypotheses 2 and 3 and verify that each mechanism (emotions and uncertainty reduction) operates net of the other. In terms of our theoretical model (see Figure 2), these mechanisms suggest how exchange frequencies produce emotions and cognitions that produce dyadic cohesion. Evidence for both the emotional/affective and uncertainty reduction pathways is consistent with the dual process model of commitment found in a study of three-actor productive exchange (Lawler et al. 2000) and related work on organizational commitment (Yoon and Thye 2002). Next we examine how these forces are related to group formation at the network level.

Insert Table 4 Here

Group Formation

The final step in the analysis is to determine whether perceived cohesion at the dyadic level is a proximal cause of group formation at the network level (Hypotheses 2c and 3c). Table 4 shows regression results for both perceived group affiliation and resource sharing in a dictator setting. In both cases, there are significant positive effects for cohesion controlling all other

variables in the model ($b = .343, p < .01$ for group affiliation, and $b = .420, p < .01$ for resource sharing). The effects on perceived group affiliation reflect the cognitive dimension of group formation, and the effects on resource sharing reflect the behavioral dimension. Thus, in conjunction with the aforementioned support for the mediating links, these findings affirm the indirect pathways from dimensions of structural cohesion to group formation: Structural dimensions determine exchange frequencies, which in turn shape positive emotions and uncertainty reduction; positive emotions and uncertainty reduction generate dyadic-level cohesion that in turn fosters group formation at the network level. Overall, this chain of evidence strongly supports the micro-mediating links predicted by our theory (see Figure 1).¹⁴

There are a few unpredicted effects on group formation in Table 4 worthy of note. The most important are the significant negative effects of the equal and weak power dummies on resource sharing in the dictator game. These suggest why there is no main effect of power type on dictator allocations in the Table 2 ANOVA. To explore this further, we examined the mean level of sharing resources for each position within each network. This analysis revealed that participants occupying the strong power (central) positions in the 3- and 4-branch networks were considerably more generous than expected in the dictator game (proportion given to others = .42 and .44, respectively). Those occupying the low power positions were less generous than the high power actors (average proportion = .18 across both strong power networks). Not

¹⁴ Pushing our logic further, we devised a plausible way to directly examine the role of shared experience. We created a variable that measures the *similarity* of perceptions of relational cohesion (i.e., using the standard deviation of the dyadic scores). We then created an interaction term between this variable and the measure of dyadic cohesion and examined the effects on perceived group affiliation and the sharing of resources in the dictator game. Controlling for all antecedent variables, this interaction term was marginally significant for sharing resources ($b = .04, p < .10$) and significant for perceived group affiliation ($b = .06, p < .03$). This is evidence that when individuals both experience similar and high levels of dyadic cohesion, the result is stronger group formation in cognitive and behavioral terms.

surprisingly, those in equal power networks fall between the high and lower power actors of the branch (proportion = .25).

Three implications for branch structures can be drawn from the dictator results. First, the negative direct effects for equal and weak power (in column 2 of Table 4) reflect the different allocations by low and high power actors. Because there are more low power positions in the branch structures than high power positions, when we average across these positions, the condition mean is reduced proportionately. If data from the high power actors are removed from the analysis of resource sharing, and the equation in Table 4 recalculated, dyadic cohesion has a marginal positive effect on the amount of resource sharing ($b = .193, p = .09$). Second, the negative sign of the path from perceived predictability to resource sharing makes sense in this context because it suggests the predictability of bad results for low power actors (i.e., “my outcomes are predictably bad, thus I give less”). Third, there are countervailing positive and negative pathways associated with positions in strong power networks. These forces effectively conceal the positive effects of structural cohesion on group-oriented behavior in the analysis of variance.

Ancillary Results

We administered a post-questionnaire that contained two items that further clarify how structural cohesion produces perceptions of a group affiliation. The questions asked participants to think about the network as a whole and to assess (a) how collectively versus self oriented were the others in the network and (b) how untrustworthy-trustworthy were the others. Participants responded on 9- point scales anchored by these poles. Regressing these two items on the full set

of variables in the model (as in Table 4), the results show positive effects for dyadic-level cohesion on perceptions of a collective orientation by others in the network ($b = .24, p < .05$) and also on the degree that others in the network were trustworthy ($b = .26, p < .05$). Moreover, these items are highly correlated with the two dimensions of group formation—perceptions of group affiliation (for collective orientation, $r = .61, p < .001$; for trustworthiness, $r = .55, p < .001$) and sharing of resources in the dictator setting (for collective orientation, $r = .30, p < .01$; for trustworthiness, $r = .34, p < .001$). These results further explicate how exchange dynamics can unleash network-to-group transformations.

DISCUSSION

The concept of structural cohesion is central to understanding how it is that networks evolve into groups in cognitive and behavioral terms. Two dimensions of structural cohesion—variations of power relations and the likelihood of inclusion—are derived from network exchange theory and research. Network exchange theory interconnects the likelihood of inclusion and power by treating structural power in terms of the capacity to include (or exclude) others from exchange. We analytically separate these two structural dimensions and show that they do not covary uniformly across exchange networks. Macro research on structural cohesion has grappled with this same issue by distinguishing the structural equivalence of positions in a network from the density of ties in the network (see Burt 1983; Mizruchi 1990). This distinction corresponds broadly with our distinction between power and inclusion in exchange networks. Power in exchange networks can be framed in terms of structural equivalence, and the likelihood of inclusion can be construed as a function of network density. In macro research, as in our

research, structural cohesion is a potential that may or may not be realized, and if realized, it is manifest in similar cognitive and behavioral responses of actors in the network (Mizruchi 1990; Moody and White 2003). We demonstrate this phenomenon at the micro level, showing how the two dimensions of structural cohesion unleash emotions and perceptions that produce group formation. Structural cohesion is essentially “realized” when the network takes on group properties.

The general message of our research is that network structures that (a) enable more actors across the network to be included in exchange and (b) contain a high proportion of equal power relations generate group formation in cognitive and behavioral terms. Moreover, these two dimensions of structural cohesion have effects that are primarily indirect. They occur through a micro-mediating process wherein social exchange generates positive emotions and a reduced sense of uncertainty. We theorize that the confluence of structural cohesion with these emotions and cognitions generates a sense of common or shared experience among actors in the network; this then becomes manifest in group formation. Overall, the data from a five-condition experiment confirm these theoretical predictions and illustrate how structural cohesion (an objective structural potential) creates interactions that foster network-level group formation.

Our theorizing and underlying research interweave and reveal important connections between four theoretical traditions: exchange network theory (Cook et al. 1983; Markovsky et al. 1988; Wilier 1999), relational cohesion theory (Lawler et al. 2000; Lawler and Yoon 1996), social identity theory (Hogg 2000, 2001), and macro work on social embeddedness (Granovetter 1985; Uzzi 1996, 1997). Exchange network theories emphasize how structure impacts power and the opportunity for repeated exchange. Relational cohesion theory emphasizes how and when repeated exchange generates cohesive exchange relations at the dyadic level. Social identity

theory emphasizes subtle ways that group affiliations emerge among a set of actors such that they treat each other with reference to that affiliation or group identity. Macro theories of social embeddedness trace how networks and group affiliations affect the logic of markets and economic transactions. The theory and research in this article can be construed as bringing together three micro traditions to inform and illuminate a phenomenon of relevance for macro research on embeddedness— namely, how the micro processes of interaction produce differences between arms-length and embedded transactions (McGinn and Keros 2002).

We offer experimental research that examines five exchange networks within which there are strong impediments to group formation. All networks are competitive in that only one exchange per person is possible on any given episode. The network itself does nothing for individuals except generate a series of opportunities for and constraints on dyadic exchange. The networks are impersonal in the sense that actors have very limited knowledge about exchange partners and must formally negotiate with them for profit. The sole purpose of the exchange is to maximize profits and profits occur only from negotiating exchanges with a single other. Recent work by Molm and associates (Molm, Collett, and Schaefer 2006, 2007) finds that in negotiated exchange conflict is salient and trust is difficult to establish. The cumulative effect of these conditions is to generate competition and animus among the potential exchange partners. In the context of these impediments, our experimental research reveals conditions where group formation can surmount these hurdles and provides a conservative test of our theory.

The experimental findings support our three main hypotheses. The positive effects of structural cohesion on group formation are indirect and mediated through exchange frequency and both the emotional/affective and uncertainty reduction processes. Across the networks studied here, successfully exchanging with another generated positive feelings and these fostered

a stronger sense of cohesion at the relational level. The same results occur for uncertainty reduction. The impact of repeated exchange on both positive emotions and uncertainty reduction is consistent with related literatures on relational cohesion (Lawler and Yoon 1996; Thye et al. 2002) and on uncertainty reduction (Kollock 1994), suggesting these are dual processes. By comparing a variety of networks, all of which involve significant exogenous uncertainty, we are able to demonstrate more conclusively than prior research that these are distinct, separable endogenous processes connecting network structure to the cohesion of exchange relations that form in the network.

Relational cohesion theory and analyses of uncertainty in exchange essentially stop at the relational or dyadic level. For relational cohesion theory, the emotions generated from exchange are attributed to the relation and these give that relation intrinsic value or worth (Lawler and Yoon 1996, 1998). Relational commitments are a function of the cohesiveness and implicit value of the relation. For research on uncertainty, commitment to a particular exchange relation reduces the uncertainty of the situation, making it unnecessary to search for and take a chance on other possible exchange partners (Cook and Emerson 1984; Kollock 1994). We break new ground by theorizing and empirically showing how dyadic-level cohesion or commitment generates group formation at the network level. This occurs because (a) structurally cohesive networks shape social exchange patterns, (b) emotions produce the perception that dyadic ties are cohesive, and (c) actors' shared experiences lead them to define self and other in more collective terms. As a result of these processes, networks high in structural cohesion unleash processes that promote group formation.

The present work is also related to recent evidence on the emergence of micro social order (Lawler et al. 2008). A *micro social order* is a recurrent pattern of activity (interaction,

transaction, exchange) among two or more actors with four dimensions: (a) Actors exchange with or orient their behavior toward members of the social unit, (b) they experience global emotions from those interactions, (c) individuals develop affective attachments to the larger social unit, and (d) actors come to perceive they are a social unit (Lawler 2002). Our theory of structural cohesion is concerned with explaining how the fourth dimension of micro social order can originate from purely structural conditions. We theorize how networks of competitive agents, each vying to maximize self-interest in a negotiated exchange context, can nonetheless come to see themselves as members of a common group and orient their behavior toward one another. In this sense, our work illustrates how networks high in structural cohesion may nevertheless provide a foundation group formation at a cognitive and behavioral level.

The results for resource sharing in the dictator game raise issues for future research. We did not expect to find higher levels of resource sharing in the dictator game for those participants in strong power positions. The network shape was fixed and known to all actors. In this context, it is conceivable that the high power actors in the strong power networks, having benefited so much from the negotiations, experience some mild negative feelings (shame or guilt). They could attribute their profit advantage to the network and “rules” of exchange, and sharing in the dictator allocations could be a form of restitution designed to redress the inequality and ease such feelings. Thus, a plausible hypothesis is that under some structural conditions, negative emotions (directed at self) associated with power advantages reduce self-interested behavior or increase collectively oriented behavior. Given that dictator allocations are a relatively clear indicator of self- versus collectively oriented behavior, it is noteworthy that we have evidence indicating strong power networks may generate more group-oriented behavior (or less self-oriented behavior) by powerful actors. This pattern does not undermine our fundamental point about the

role of structural cohesion in these networks because the results also show that resource sharing varied more across high and low power positions in the branch than across positions in the equal power networks, yet another indication of group formation at the collective level.

Our research has broad implications for macro sociological work on the social embeddedness of market transactions (Granovetter 1985, 1992; Krippner 2001; Uzzi 1996; Uzzi and Lancaster 2004). First, we demonstrate in a controlled experimental setting that structural cohesion elucidates some aspects of exchange networks that account for the development of social embeddedness (cf. DiMaggio and Louch 1998). Second, the concept of “social embeddedness” implies a perceived “group affiliation” as examined here. In the macro literature, social ties have effects on transactions because those ties (a) emerge via repeated interactions that reduce market uncertainties, (b) facilitate information sharing and governance, and (c) are perceived as valuable beyond the current transaction or contract (e.g., Uzzi 1996; Uzzi and Lancaster 2004; Zuckerman and Sgourev 2006). The macro literature starts with socially embedded ties at the relational or group level and examines the subsequent impact on market transactions. We begin with sparse, impersonal exchange networks and examine how and when competitive transactions foster social embeddedness at the network level. In this sense, we find that the seeds of embeddedness are located in network configurations. Third, our research suggests that an emotional/affective process is important to understanding social embeddedness along with the uncertainty reduction and trust process typically assumed. Positive emotions may help to explain why relational or group affiliations take on value in and of themselves and thus how expressive ties may develop and be sustained even in economic markets (see Lawler et al. 2008).

In closing, the central points of this research are as follows. First, under structural and incentive conditions that militate against group formation in networks, we find evidence of emergent group formation. This occurs as actors exchange with select others repeatedly in the context of network opportunities and constraints. Networks that are structurally more cohesive tend to promote group formation among self-interested actors who pursue those interests through dyadic exchanges. Second, the structural cohesion effects on group formation are primarily indirect. These indirect effects entail mediation through the positive emotions and uncertainty reduction generated by repeated (dyadic) exchanges within the network. Positive feelings and uncertainty reduction have “local” effects on exchange relations. We provide evidence that these processes enhance the perception of a group affiliation at the network level and promote more collectively oriented behavior. Overall, the research suggests subtle ways that networks generate emergent groups and collectively oriented behavior. The implication is that group formation is likely to occur even in networks of competition. In fact, in light of the theory and evidence presented here, it may be difficult to prevent group formation when competitive networks entail high structural cohesion.

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Figure 1

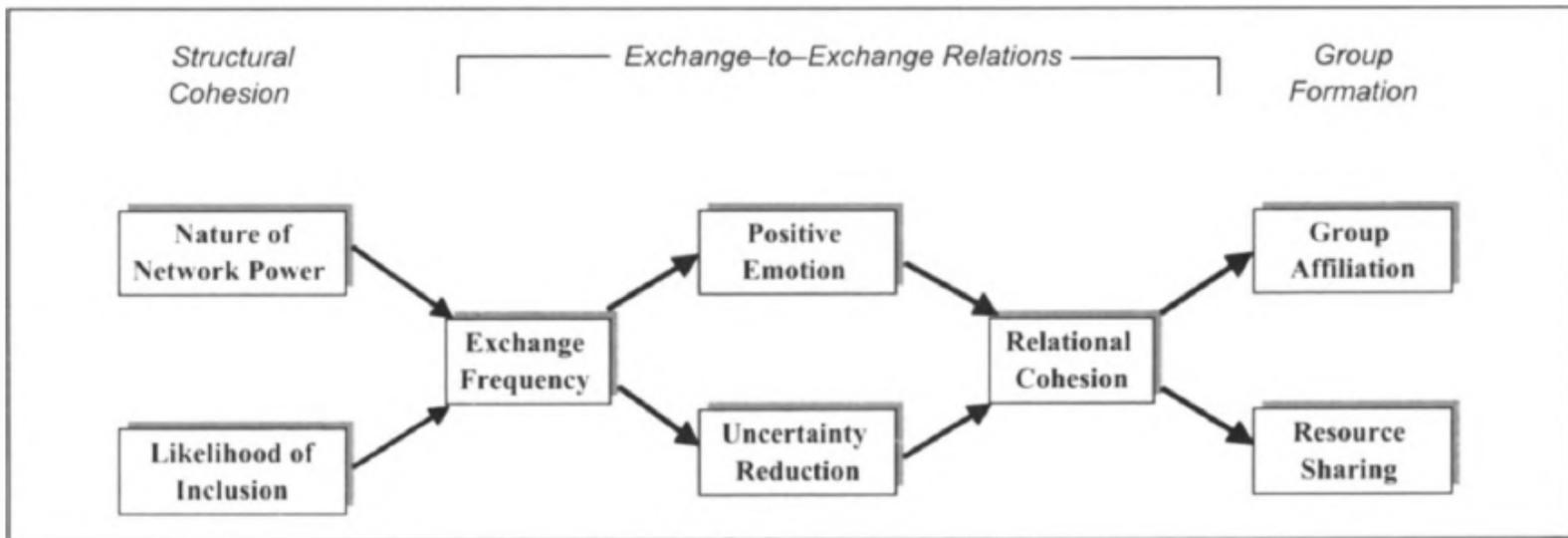


Figure 1. A Theoretical Model of Network-to-Group Formation

Figure 2

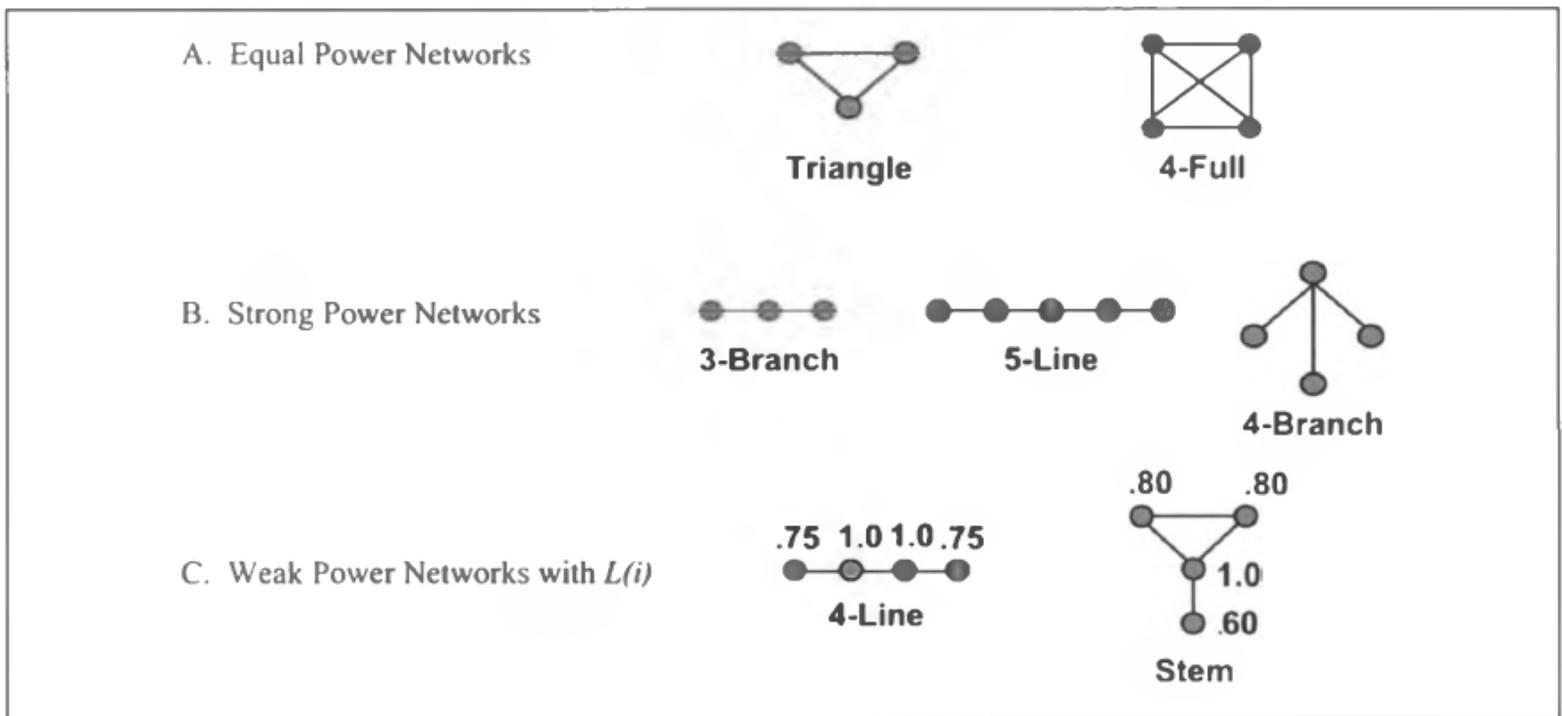


Figure 2. Some Common Equal, Strong, and Weak Power Networks

Note: $L(i)$ = likelihood of inclusion.

Table 1

Table 1. Predicted Group Formation across Five Competitive Networks

Structural cohesion and predicted group formation	Name and network	Type of network power	Likelihood of inclusion L(i)	
Highest	4-full		Equal power	1.00
	Triangle		Equal power	.67
Moderate	4-line		Weak power	.87
	3-branch		Strong power	.67
Lowest	4-branch		Strong power	.50

Table 2

Table 2. Means, Standard Deviations, and ANOVA Results for Select Variables (N = 75)

Power	Network structure	Exchange frequency		Profit difference		Group affiliation		Resource sharing	
		M	SD	M	SD	M	SD	M	SD
Equal	4-full	.854	.081 ^a	2.63	2.67 ^a	4.95	.69 ^a	.281	.155
	Triangle	.655	.033 ^b	2.85	2.25 ^a	4.68	1.0 ^{a,b}	.227	.113
Weak	4-line	.640	.075 ^b	5.62	6.64 ^{a,b}	4.03	.68 ^{a,b}	.226	.115
Strong	3-branch	.603	.087 ^b	7.97	5.30 ^b	4.08	.71 ^{a,b}	.256	.100
	4-branch	.488	.023 ^c	14.1	6.73 ^c	3.96	.63 ^b	.248	.110
$F_{(4,70)}$		61.19		17.5		4.88		.54	
<i>p</i> value		<.001		<.001		<.001		<i>ns</i>	

Notes: 4-full, triangle, 4-line, 3-branch, and 4-branch each refer to networks of four-actor fully connected box, three-actor triangle, four-actor line, three-actor branch, and four-actor branch. Means with the same letter are not significantly different as determined by Tukey's honestly significant difference (HSD) tests.

Table 3

Table 3. Standardized Ordinary Least Squares (OLS) Coefficients for Paths in Endogenous Process (N = 75)

Independent	Dependent			
	Pleasure/ satisfaction	Interest/ excitement	Predictability	Dyadic cohesion
Equal power	.010	.115	-.484**	.384**
Weak power	.240	.284	-.064	.354**
Likelihood of inclusion	-.320	-.637**	-.080	-.122
Profit difference	-.078	.067	-.084	.283*
Exchange frequency	.447*	.478*	.501*	.074
Pleasure/satisfaction	—	—	—	.382**
Interest/excitement	—	—	—	.163
Perceived predictability	—	—	—	.312**
R^2	.08	.09	.12	.47

Notes: Equal and weak power are dummy variables where strong power is the omitted category. When weak power is the omitted category, we find no direct effect of equal power on dyadic cohesion. All other results remain the same.

* $p < .05$. ** $p < .01$. *** $p < .001$ (one-tailed tests).

Table 4

Table 4. Standardized Ordinary Least Squares (OLS) Coefficients for Regression of Perceived Group Affiliation and Resource Sharing on Preceding Variables (N = 75)

Independent variables	Dependent	
	Perceived group affiliation	Resource sharing
Equal power	.043	-.360*
Weak power	-.194	-.341*
Likelihood of inclusion	-.081	.366
Profit difference	-.164	.053
Exchange frequency	.349	.101
Pleasure/satisfaction	.059	-.220
Interest/excitement	.072	.339*
Perceived predictability	-.119	-.298**
Dyadic cohesion	.343**	.420**
R^2	.41	.33

Notes: One extreme outlier in the dictator variable was replaced with the mean value.

* $p < .05$. ** $p < .01$. *** $p < .001$ (one-tailed tests).

References

- Amabile, Teresa M., Sigal G. Barsade, Jennifer S. Mueller, and Barry M. Staw. 2005. "Affect and Creativity at Work." *Administrative Science Quarterly* 50:367-403.
- Anthony, Denise. 2005. "Cooperation in Microcredit Borrowing Groups." *American Sociological Review* 70:496-515.
- Ashby, F. Gregory, Alice Isen, and U. Turken. 1999. "A Neuropsychological Theory of Positive Affect and Its Influence on Cognition." *Psychological Review* 106: 529-50.
- Barsade, Sigal G. 2002. "The Ripple Effect: Emotional Contagion and Its Influence on Group Behavior." *Administrative Science Quarterly* 47:644-75.
- Berger, Peter L. and Thomas Luckmann. 1966. *The Social Construction of Reality*. New York: Doubleday.
- Blau, Peter M. 1964. *Exchange and Power in Social Life*. New York: John Wiley.
- Blau, Peter M. 1977. *Inequality and Heterogeneity*. New York: Free Press.
- Bollen, Kenneth A. and Rick H. Hoyle. 1990. "Perceived Cohesion: A Conceptual and Empirical Examination." *Social Forces* 69:479-504.
- Bonacich, Phillip and Elisa Jayne Bienenstock. 1993. "Assignment Games, Chromatic Number and Exchange Theory." *Journal of Mathematical Sociology* 17:243-59.
- Borgatti, Stephen P. and Martin G. Everett. 1992. "Graph Colorings and Power in Social Exchange Networks." *Social Networks* 14:287-308.
- Brief, Arthur P. and Howard M. Weiss. 2002. "Organizational Behavior: Affect in the Workplace." *Annual Review of Psychology* 53:279-308.

- Brown, Rupert J. 2000. *Group Processes: Dynamics within and between Groups*. Oxford, UK: Blackwell.
- Brown, Rupert J. and G. S. Wade. 1987. "Superordinate Goals and Intergroup Behavior: The Effects of Role Ambiguity and Status on Intergroup Attitudes and Task Performance." *European Journal of Social Psychology* 10:399-414.
- Buccola, Steven T. and Loren VanderZanden. 1997. "Wine Demand, Price Strategy, and Tax Policy." *Review of Agricultural Economics* 19:428-40.
- Burt, Ronald S. 1978. "Cohesion versus Structural Equivalence as a Basis for Network Subgroups." *Sociological Methods and Research* 7:189-212.
- Burt, Ronald S. 1983. *Corporate Profits and Cooptation*. New York: Academic Press.
- Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.
- Collins, Randall. 1981. "On the Microfoundations of Macrosociology." *American Journal of Sociology* 86:984-1014.
- Collins, Randall. 1989. "Toward a Neo-Median Sociology of Mind." *Symbolic Interaction* 12:1-32.
- Collins, Randall. 2004. *Interaction Ritual Chains*. Princeton, NJ: Princeton University Press.
- Cook, Karen S. and Richard M. Emerson. 1978. "Power, Equity, and Commitment in Exchange Networks." *American Sociological Review* 43:721-39.
- Cook, Karen S. and Richard M. Emerson. 1984. "Exchange Networks and the Analysis of Complex Organizations." Pp. 1-30 in *Research on the Sociology of Organizations*. Vol. 3, edited by S. Bacharach and E. J. Lawler. Greenwich, CT: JAI Press.

Cook, Karen S., Richard M. Emerson, Mary R. Gillmore, and Toshio Yamagishi. 1983. "The Distribution of Power in Exchange Networks: Theory and Experimental Evidence."

American Journal of Sociology 89:275-305.

DiMaggio, Paul and Hugh Louch. 1998. "Socially Embedded Consumer Transactions: For What Kinds of Purchases Do People Most Often Use Networks?" *American Sociological*

Review 63:619-37.

Doreian, Patrick and Thomas Fararo. 1998. *The Problem of Solidarity: Theories and Models*.

Amsterdam, the Netherlands: Gordon and Breach Publishers.

Ellemers, Naomi, Russell Spears, and Bertjan Doosje. 1997. "Sticking Together or Falling Apart: Ingroup Identification as a Psychological Determinant of Group Commitment versus

Individual Mobility." *Journal of Personality and Social Psychology* 72:617-26.

Emerson, Richard M. 1972a. "Exchange Theory, Part I: A Psychological Basis for Social

Exchange." Pp. 38-57 in *Sociological Theories in Progress*. Vol. 2, edited by J. Berger, M. Zelditch Jr., and B. Anderson. Boston: Houghton-Mifflin.

Emerson, Richard M. 1972b. "Exchange Theory, Part II: Exchange Relations and Networks." Pp.

58-87 in *Sociological Theories in Progress*. Vol. 2, edited by J. Berger, M. Zelditch Jr., and B. Anderson. Boston: Houghton-Mifflin.

Emerson, Richard M. 1981. "Social Exchange Theory." Pp. 30-65 in *Social Psychology:*

Sociological Perspectives, edited by M. Rosenberg and R. H. Turner. New York: Basic Books, Inc.

Gasper, Karen and Gerald L. Clore. 2002. "Attending to the Big Picture: Mood and Global

versus Local Processing of Visual Information." *Psychological Science* 13:34r-40.

- Girard, Dudley and Casey Borch. 2002. "Optimal Seek Simplified." *Current Research in Social Psychology* 8:225-41.
- Granovetter, Mark. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:481-510.
- Granovetter, Mark. 1992. "Problems of Explanation in Economic Sociology." Pp. 25-56 in *Networks and Organizations: Structure, Form, and Action*, edited by N. Nohria and R. G. Eccles. Boston, MA: Harvard Business School Press.
- Gulati, Ranjay and Maxim Sytch. 2007. "Dependence Asymmetry and Joint Dependence in Interorganizational Relationships: Effects of Embeddedness on a Manufacturer's Performance in Procurement Relationships." *Administrative Science Quarterly* 52:32-69.
- Guth, Werner and Steffen Huck. 1997. "From Ultimatum Bargaining to Dictatorship— An Experimental Study of Four Games Varying in Veto Power." *Metroeconomica* 48:262-79.
- Hogg, Michael A. 1992. *The Social Psychology of Group Cohesiveness: From Attraction to Social Identity*. London: Harvester/Wheatsheaf.
- Hogg, Michael A. 2000. "Subjective Uncertainty Reduction through Self-Categorization: A Motivational Theory of Social Identity Processes." *European Review of Social Psychology* 11:223-55.
- Hogg, Michael A. 2001. "Self-Categorization and Subjective Uncertainty Resolution: Cognitive and Motivational Facets of Social Identity and Group Membership." Pp. 323-49 in *The Social Mind: Cognitive and Motivational Aspects of Interpersonal Behavior*, edited by J. P. Forgas, K. D. Williams, and L. Wheeler. New York: Cambridge University Press.

- Hogg, Michael A. 2005. "Uncertainty, Social Identity, and Ideology." Pp. 203-29 in *Advances in Group Process*. Vol. 22, edited by S. R. Thye and E. J. Lawler. Oxford, UK: Elsevier.
- Hogg, Michael A. and Dominic Abrams. 1993. "Towards a Single-Process Uncertainty Reduction Model of Social Motivation in Groups. Pp. 173-90 in *Group Motivation: Social Psychological Perspectives*, edited by M. A. Hogg and D. Abrams. Upper Saddle River, NJ: Prentice Hall.
- Hogg, Michael A. and Barbara A. Mullin. 1999. "Joining Groups to Reduce Uncertainty: Subjective Uncertainty Reduction and Group Identification." Pp. 249-79 in *Social Identity and Social Cognition*, edited by D. Abrams and M. A. Hogg. Oxford, UK: Blackwell.
- Isen, Alice M. 1987. "Positive Affect, Cognitive Processes, and Social Behavior." Pp. 20353 in *Advances in Experimental Social Psychology*, edited by L. Berkowitz. New York: Academic.
- Kollock, Peter 1994. "The Emergence of Exchange Structures: An Experimental Study of Uncertainty, Commitment, and Trust." *American Journal of Sociology* 100:315-45.
- Kollock, Peter 1999. "The Production of Trust in Online Markets." Pp. 99-123 in *Advances in Group Process*. Vol. 16., edited by S. Thye, E. J. Lawler, M. W. Macy, and H. A. Walker. Greenwich, CT: JAI Press.
- Krippner, Gretta. R. 2001. "The Elusive Market: Embeddedness and the Paradigm of Economic Sociology." *Theory and Society* 30:775-810.
- Kyriakidou, Olympia and Mustafa F. Ozbilgin, eds. 2006. *Relational Perspectives in Organizational Studies: A Research Companion*. Northampton, MA: Edward Elgar Publishing.

- Lawler, Edward J. 2001. "An Affect Theory of Social Exchange." *American Journal of Sociology* 107:321-52.
- Lawler, Edward J. 2002. "Micro Social Orders." *Social Psychology Quarterly* 65:4-17.
- Lawler, Edward J. and Shane R. Thye. 1999. "Bringing Emotions into Social Exchange Theory." *Annual Review of Sociology* 25:217-44.
- Lawler, Edward J., Shane R. Thye, and Jeongkoo Yoon. 2000. "Emotion and Group Cohesion in Productive Exchange." *American Journal of Sociology* 106:616-57.
- Lawler, Edward J., Shane R. Thye, and Jeongkoo Yoon. 2006. "Commitment in Structurally Enabled and Induced Exchange Relations." *Social Psychology Quarterly* 69:183-200.
- Lawler, Edward J., Shane R. Thye, and Jeongkoo Yoon. 2008. "Social Exchange and Micro Social Order." *American Sociological Review* 73:519-42.
- Lawler, Edward J., Shane R. Thye, and Jeongkoo Yoon. 2009. *Social Commitments in a Depersonalized World*. New York: The Russell Sage Foundation.
- Lawler, Edward J. and Jeongkoo Yoon. 1996. "Commitment in Exchange Relations: Test of a Theory of Relational Cohesion." *American Sociological Review* 61:89-108.
- Lawler, Edward J. and Jeongkoo Yoon. 1998. "Network Structure and Emotion in Exchange Relations." *American Sociological Review* 63:871-94.
- Lawler, Edward J., Jeongkoo Yoon, Mouraine R. Baker, and Michael D. Large. 1995. "Mutual Dependence and Gift Giving in Exchange Relations." Pp. 271-98 in *Advances in Group Process*. Vol. 15, edited by B. Markovsky, J. O'Brien, and K. Heimer. Greenwich, CT: JAI Press.

- Lickel, Brian, David L. Himilton, Grazyna Wieczorkowska, Amy Lewis, Steven J. Sherman, and Neville A. Uhles. 2000. "Varieties of Groups and the Perception of Group Entitativity." *Journal of Personality and Social Psychology* 78:223—46.
- Lovaglia, Michael J., John Skvoretz, Barry Markovsky, and David Wilier, 1995. "Assessing Fundamental Power Differences in Exchange Networks: Iterative GPI." *Current Research in Social Psychology* 1(2):8-15.
- Lucas, Jeffery, C. Wesley Younts, Michael J. Lovaglia, and Barry Markovsky. 2001. "Lines of Power in Exchange Networks." *Social Forces* 80:185-214.
- Markovsky, Barry and Edward J. Lawler. 1994. "A New Theory of Group Solidarity." Pp. 113-37 in *Advances in Group Process*. Vol. 11, edited by B. Markovsky, K. Heimer, and J. O'Brien. Greenwich, CT: JAI Press.
- Markovsky, Barry, John Skvoretz, David Wilier, Michael J. Lovaglia, and Jeffery Erger. 1993. "The Seeds of Weak Power: An Extension of Network Exchange Theory." *American Sociological Review* 58:197-209.
- Markovsky, Barry, David Wilier, and Travis Patton. 1988. "Power Relations in Exchange Networks." *American Sociological Review* 53:220-36.
- McGinn, Kathleen L. and Angela T. Keros. 2002. "Improvisation and the Logic of Exchange om Socially Embedded Transactions." *Administrative Science Quarterly* 47:442-73.
- Mizruchi, Mark S. 1990. "Cohesion, Structural Equivalence, and Similarity of Behavior: An Approach to the Study of Corporate Political Power." *Sociological Theory* 8:16-32.
- Molm, Linda D. 1994. "Dependence and Risk: Transforming the Structure of Social Exchange." *Social Psychology Quarterly* 57:163-76.

- Molm, Linda D. 2003a. "Power, Trust, and Fairness: Comparisons of Negotiated and Reciprocal Exchange." Pp. 31-66 in *Advances in Group Processes: Power and Status*. Vol. 20, edited by S. R. Thye and J. Skvoretz. Oxford, UK: Elsevier.
- Molm, Linda D. 2003b. "Theoretical Comparisons of Forms of Exchange." *Sociological Theory* 21:1-17.
- Molm, Linda D., Jessica L. Collett, and David R. Schaefer. 2006. "Conflict and Fairness in Social Exchange." *Social Forces* 84:2331-52.
- Molm, Linda D., Jessica L. Collett, and David R. Schaefer. 2007. "Building Solidarity through Generalized Exchange: A Theory of Reciprocity." *American Journal of Sociology* 113:205-42.
- Molm, Linda, Gretchen Peterson, and Nobuyuki Takahashi. 1999. "Power in Negotiated and Reciprocal Exchange." *American Sociological Review* 64:876-90.
- Moody, James and Douglas R. White. 2003. "Structural Cohesion and Embeddedness: A Hierarchical Concept of Groups." *American Sociological Review* 68:103-7.
- Powell, Walter W. 1990. "Neither Market nor Hierarchy: Network Forms of Organization." Pp. 295-336 in *Research in Organizational Behavior*, edited by R. I. Sutton and B. M. Staw. Greenwich, CT: JAI Press.
- Rosenthal, Donald B. 1966. "Factions and Alliances in Indian City Politics." *Midwest Journal of Political Science* 10:320-49.
- Roth, Alvin. 1995. "Bargaining Experiments." Pp. 235-348 in *Handbook of Experimental Economics*, edited by J. Kagel and A. Roth. Princeton, NJ: Princeton University Press.

- Simpson, Brent and David Wilier. 1999. "A New Method for Finding Power Structures." Pp. 270-84 in *Network Exchange Theory*, edited by D. Wilier. Westport, CT: Greenwood Press.
- Simmel, Georg. 1950. *The Sociology of Georg Simmel*. New York: Free Press.
- Skvoretz, John and Michael J. Lovaglia. 1995. "Who Exchanges with Whom: Structural Determinants of Exchange Frequency in Negotiated Exchange Networks." *Social Psychology Quarterly* 58:163-77.
- Stolte, John and Richard M. Emerson. 1977. "Structural Inequality: Position and Power in Exchange Structures." Pp. 117-38 in *Behavioral Theory in Sociology*, edited by R. Hamblin and J. Kunkel. New Brunswick, NJ: Transaction Books.
- Tajfel, Henri, ed. 1978. *Differentiation between Social Groups: Studies in the Social Psychology of Intergroup Relations*. San Diego, CA: Academic Press.
- Tajfel, Henri and John C. Turner. 1986. "The Social Identity Theory of Intergroup Behavior." Pp. 7-24 in *Psychology of Intergroup Relations*, edited by S. Worchel and W. G. Austin. Chicago: Nelson-Hall.
- Thye, Shane R. 2000a. "Reliability in Experimental Sociology." *Social Forces* 74:1277-309.
- Thye, Shane R. 2000b. "A Status Value Theory of Power in Exchange Networks." *American Sociological Review* 65:407-32.
- Thye, Shane R., Michael J. Lovaglia, and Barry Markovsky. 1997. "Responses to Social Exchange and Social Exclusion in Networks." *Social Forces* 75:1031-47.
- Thye, Shane R., Jeongkoo Yoon, and Edward J. Lawler. 2002. "The Theory of Relational Cohesion: Review of a Research Program." Pp. 139-66 in *Advances in Group Process*. Vol. 19, edited by S. R. Thye and E. J. Lawler. Oxford, UK: Elsevier.

- Uzzi, Brian. 1996. "The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect." *American Sociological Review* 61:674-98.
- Uzzi, Brian. 1997. "Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness." *Administrative Science Quarterly* 42:35-67.
- Uzzi, Brian. 1999. "Embeddedness in the Making of Financial Capital: How Social Relations and Networks Benefit Firms Seeking Financing." *American Sociological Review* 64:481-505.
- Uzzi, Brian and Ryon Lancaster. 2004. "Embeddedness and Price Formation in the Corporate Law Market." *American Sociological Review* 69:319-44.
- Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge, UK: Cambridge University Press.
- White, Douglas R. and Frank Harary. 2001. "The Cohesiveness of Blocks in Social Networks: Node Connectivity and Conditional Density." *Sociological Methodology* 31:305-59.
- Wilier, David. 1999. *Network Exchange Theory*. Westport, CT: Praeger.
- Williamson, Oliver E. 1981. "The Economics of Organization: The Transaction Cost Approach." *American Journal of Sociology* 87:548-77.
- Yoon, Jeongkoo and Shane R. Thye. 2002. "A Dual Process Model of Organizational Commitment." *Work and Occupations* 29:97-124.
- Zuckerman, Ezra W. and Stoyan Sgourev. 2006. "Peer Capitalism: The Role of Parallel Relationships in the Market Economy." *American Journal of Sociology* 111:1327-66.
- Zukin, Sharon and Paul DiMaggio. 1990. *Structures of Capital: The Social Organization of the Economy*. New York: Cambridge University Press.