

# **Building Solidarity through Generalized Exchange: A Theory of Reciprocity<sup>1</sup>**

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Despite the prevalence of generalized exchange in social life, few studies have investigated the classic anthropological prediction that generalized (indirect) exchange produces greater social solidarity than restricted (direct) exchange. Building on recent work comparing negotiated and reciprocal forms of direct exchange, the authors develop a theory of reciprocity in exchange. The theory argues that two structural characteristics of reciprocity distinguish among all three forms of exchange and affect the emergence of social solidarity through three causal mechanisms. Experimental results provide strong support for the causal logic of the theory and for the predicted ordering of subjective dimensions of solidarity across the three forms of exchange, with generalized indirect exchange > reciprocal direct exchange > negotiated direct exchange.

From the kinship structures of primitive peoples, to the barn raisings of 19th-century America, to the vast sharing of software and information on the modern Internet, systems of generalized exchange have always been a ubiquitous part of social life. Scholars have proposed that generalized exchange may help buffer resource fluctuations (Cashdan 1985),

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establish reputations that facilitate transactions (Kollock 1999), and contribute to the development of moral norms (Nowak and Sigmund 2005). But for sociologists concerned with social capital and civic community, the most important benefit of generalized exchange may be its presumed enhancement of social solidarity, including bonds of trust and affective regard.

The notion that generalized exchange produces greater solidarity than direct or restricted exchange was first advanced by Lévi-Strauss (1969) and other classical anthropological exchange theorists (Malinowski 1922; Mauss 1925; Sahlins 1965), who distinguished between forms of exchange with structures of *direct* or *indirect* reciprocity. In direct (or restricted) exchange, two actors give benefits to one another in a relation of direct reciprocity: A gives to B, and B to A. In indirect (or generalized) exchange, each actor gives benefits to another and eventually receives benefits from another, *but not from the same actor*. Lévi-Strauss argued that this collective system of indirect exchange, which inherently involves more than two people, generates stronger bonds of solidarity than pairwise, restricted exchange.

Despite the relevance of this classic prediction to contemporary sociological concerns, it has rarely been tested. The contemporary sociological literature includes only half a dozen or so studies of generalized exchange (Bearman 1997; Gillmore 1987; O'Connell 1984; Takahashi 2000; Uehara 1990; Yamagishi and Cook 1993; Ziegler 1990), only some of which are centrally concerned with the effects of generalized exchange on solidarity. Only two of these—Gillmore (1987) and Uehara (1990)—compare the effects of direct (restricted) and indirect (generalized) exchange on social solidarity, both within rather particular contexts (Gillmore as a means of coalition formation among disadvantaged actors, and Uehara as patterns of social support among low-income urban black women).

In this article we approach the study of generalized exchange and solidarity from the context of a broader theory that describes how the structure of reciprocity in exchange affects the solidarity of bonds that arise from exchange. Building on recent work comparing negotiated and reciprocal forms of *direct* exchange (Molm 1994, 2003), we identify two structural characteristics of reciprocity in exchange relations—indirect versus direct reciprocation of benefits, and unilateral versus bilateral flow of benefits—that vary across, and distinguish among, all three forms of exchange: direct negotiated, direct reciprocal, and indirect generalized. We propose that these structural dimensions of reciprocity affect differences in solidarity between direct and indirect forms of exchange through three theoretical mechanisms that also distinguish between reciprocal and negotiated forms of direct exchange: the risk of nonreciprocation, the salience of conflict, and the expressive value of voluntary reciprocity.

We define *social solidarity* as the integrative bonds that develop between persons, and between persons and the social units to which they belong. Solidarity is potentially composed of both behavioral and affective components, but as research on social networks has shown, the two are frequently unrelated—structural or situational factors may encourage or constrain behavioral interaction independent of the strength or closeness of the relationship (Burt 1997; Wellman and Wortley 1990). We focus our analysis on subjective feelings of solidarity, characterized by a set of related components: *trust* (the belief that the exchange partner will not exploit the actor), *affective regard* (positive feelings for, and evaluations of, the partner), *social unity* (perception of the relationship as a social unit, with actors united in purpose and interests), and *feelings of commitment* to the partner and the relationship. We compare the three forms of exchange on these dimensions of solidarity in controlled laboratory experiments that allow us to distinguish the effects of the structure of reciprocity from other, potentially confounding factors, such as the resources exchanged or the substantive context of exchange.

Our results offer strong support for a structural theory of reciprocity in exchange, as well as for the classic anthropological prediction. We show that generalized exchange, which is characterized by both indirect reciprocity and unilateral flows of benefit, produces greater solidarity than either negotiated or reciprocal direct exchange, with smaller differences in solidarity distinguishing between the two direct forms of exchange. We also show that the effects of the structure of reciprocity are relatively unaffected by modest variations in network size, and that they occur even in the absence of actors' awareness of the size and shape of the network in which they are embedded. In short, they are produced by differences in the structure of reciprocity, and these differences have quite robust effects. In the following sections we develop these distinctions between direct and indirect reciprocity, and between forms of exchange with direct reciprocity, before turning to the causal logic of the theory.

#### DIRECT AND INDIRECT RECIPROCITY IN SOCIAL EXCHANGE

All forms of social exchange occur within structures of mutual dependence, that is, structures in which actors are mutually, or reciprocally, dependent on one another for valued outcomes. The mutual or reciprocal dependence can be either *direct* or *indirect*. In forms of exchange with direct reciprocity (direct or restricted exchange), two actors exchange resources *with each other*—A provides value to B, and B to A—and B's reciprocation of A's giving is *direct*. In forms of exchange with indirect reciprocity (indirect or generalized exchange), the recipient of benefit does

not return benefit directly to the giver, but to another actor in the social circle.<sup>2</sup> The giver eventually receives some benefit in return, *but from a different actor*. Thus, A's giving to B is not reciprocated directly by B's giving to A, but by C's giving to A, where C is a third party.

The most common form of generalized exchange is what Takahashi (2000) has called *pure-generalized* exchange. In this form there is no fixed structure of giving; that is, A might give to B on one occasion and to C on a different occasion. Helping stranded motorists, giving blood, and reviewing journal articles are all examples of pure-generalized exchange. Because we study the two direct forms of exchange in fixed network structures, however, it is analytically desirable to do the same for indirect exchange. Consequently, we focus our analysis on the classic *chain-generalized* form of indirect exchange that Lévi-Strauss (1969) studied. In chain-generalized exchange, benefits flow in one direction in a circle of giving that eventually returns benefit to the giver. In a three-actor chain, for example, A gives to B, B gives to C, and C gives to A; thus, A's giving to B is reciprocated *indirectly*, from B through C to A. The unidirectional chain structure also represents the purest form of indirect reciprocity, with the length of the chain determining the number of indirect paths. Classic examples of chain-generalized exchange are the Kula ring (Malinowski 1922; Ziegler 1990) and matrilineal cross-cousin marriage (Bearman 1997; Lévi-Strauss 1969).<sup>3</sup>

Ekeh's (1974) elaboration of Lévi-Strauss's thesis proposed that direct and indirect structures of reciprocity produce exchanges of markedly different character, with important consequences for trust and solidarity. Direct exchanges, he argued, are characterized by high emotional tension, a "quid pro quo" mentality and strict accounting, intensely self-interested actors who engage in frequent conflict over the fairness of exchange, and low levels of trust and solidarity. Indirect exchanges, in contrast, are characterized by reduced emotional tension, a credit mentality, actors with a more collective orientation, and high levels of trust and solidarity.

As Yamagishi and Cook (1993) and Takahashi (2000) have noted, however, this emphasis on the collective aspects of generalized exchange tends to neglect other crucial elements: the high risk of the structure, the po-

<sup>2</sup> We use the terms direct and restricted exchange, and indirect and generalized exchange, interchangeably.

<sup>3</sup> Sometimes included as a form of generalized exchange is what Ekeh (1974) called "net-generalized" exchange and Yamagishi and Cook (1993) called "group-generalized" exchange. In net- or group-generalized exchange, each actor contributes resources to the group as a whole and receives benefits from the group in return. As Bearman (1997) has pointed out, however, group-generalized exchange can be reduced to direct dyadic exchanges between an individual actor (a group member) and a collective actor (the group as a whole); chain-generalized exchange cannot.

tential for those who fail to give to disrupt the entire system, and the difficulty of establishing a structure of stable giving without initial levels of high trust or established norms. We examine the establishment of generalized exchange and the development of bonds of solidarity under precisely those conditions: among strangers who have no established norms, no knowledge of one another, and no initial basis for trust. We then ask how the *structure* of indirect reciprocity affects the emergence of solidarity in comparison with forms of exchange with direct reciprocity.

#### Variations in Direct Reciprocity

In predicting that structures of direct and indirect reciprocity produce exchanges of different character, Ekeh (1974) ignored key differences *among* forms of direct exchange. Not all forms of direct exchange are characterized by a “quid pro quo” mentality, strict accounting, and an emphasis on immediate reciprocity. Of particular importance is the distinction between *negotiated* and *reciprocal* forms of direct exchange (Emerson 1981; Molm 1994).

In *direct negotiated exchange*, actors jointly negotiate the terms of an agreement that benefits both parties, either equally or unequally. Both sides of the exchange are agreed upon at the same time, and the benefits for both exchange partners are easily identified as paired contributions that form a discrete transaction. In most negotiated exchanges studied by exchange researchers, these agreements are also strictly binding; that is, they automatically produce the benefits agreed upon (Cook et al. 1983; Markovsky, Willer, and Patton 1988).

In *direct reciprocal exchange*, actors instead perform individual acts that benefit another, such as giving assistance or advice, without negotiation and without knowing whether or when or to what extent the other will reciprocate. Relations of reciprocal exchange evolve gradually, as beneficial acts prompt reciprocal benefits, in a series of sequentially contingent, individual acts. Reciprocal exchanges were assumed by most of the classical sociological exchange theorists (Blau 1964; Homans 1961) but have received less attention from contemporary researchers.

The characteristics that Ekeh and others (e.g., Sahlins 1965) have ascribed to direct exchanges are clearly more typical of direct negotiated than direct reciprocal exchanges. Theoretically, all three forms of exchange—generalized, direct negotiated, and direct reciprocal—differ from one another on a set of dimensions that potentially affect the development of social solidarity. These dimensions comprise the *structure of reciprocity* in social exchange.

A THEORY OF RECIPROCITY IN SOCIAL EXCHANGE

Background

The theory that we elaborate and extend in this article developed out of a program of experimental research comparing negotiated and reciprocal forms of direct exchange (Molm 2003; Molm, Collett, and Schaefer 2006; Molm, Peterson, and Takahashi 1999, 2001; Molm, Schaefer, and Collett 2007; Molm, Takahashi, and Peterson 2000, 2003). The original impetus for the program was Molm's (1994) theoretical analysis of the differences in *risk* created by the structure of exchange transactions and the temporal organization of transactions in reciprocal, negotiated, and generalized exchange. The theory shares the classic scope conditions of social exchange theory (Molm and Cook 1995), particularly Emerson's (1972*a*, 1972*b*) power-dependence theory: we assume that actors are dependent on one another for valued outcomes, that they are motivated to obtain more of the outcomes that they value and others control, and that they engage in recurring exchanges, in which benefits received are contingent on benefits provided, to obtain those outcomes.

The early work in the research program compared only the two direct forms of exchange, negotiated and reciprocal, that have been the focus of contemporary sociological studies of exchange. This work established strong effects of the form of exchange on integrative bonds (Molm et al. 1999, 2000, 2001, 2003) and tested the independent effects of three causal mechanisms—including risk—in producing these effects (Molm et al. 2006, 2007). This work was conducted under conditions common to most contemporary programs of research on social exchange: actors exchange within fixed network structures, relations within networks of direct exchange are negatively connected, negative actions are limited to the withholding of rewards, and all benefits obtained through exchange are “consumed”; that is, they have no subsequent exchange value. These conditions also apply to our current analysis.

The theory argues that while all forms of exchange are characterized by some type of reciprocity, the *structure* of reciprocity varies on two key dimensions that affect the social solidarity or integrative bonds that develop between actors: (1) whether benefits are reciprocated directly or indirectly, and (2) whether benefits can flow unilaterally or only bilaterally.

The first dimension, whether reciprocity is direct or indirect, corresponds to the basic distinction between direct (restricted) and indirect (generalized) forms of exchange that we have already discussed. Whether reciprocity is direct or indirect also implies two additional, related structural differences: whether exchange is dyadic (between two parties) or collective (three or more), and whether actors are dependent on the actions of a single other actor or multiple actors for valued resources. Direct

exchanges are dyadic, reciprocity is direct, and each actor is dependent solely on the other; indirect exchanges are collective, reciprocity is indirect, and each actor is dependent—directly or indirectly—on all other actors in the chain of indirect reciprocity for the benefits that are ultimately received from one particular actor.<sup>4</sup>

The second dimension, whether benefits can flow unilaterally or only bilaterally, cuts across the first dimension (see table 1). Although reciprocity is *direct* in both negotiated and reciprocal exchange, benefits can flow *unilaterally* in both reciprocal and generalized exchange. In both, each actor's outcomes are contingent solely on another's *individual* actions, and actors can initiate exchanges that are not reciprocated (and vice versa). This means that the timing of reciprocity can be delayed in both reciprocal and generalized exchange, although the greater number of actors in a chain of indirect reciprocity implies greater delay, on average, than in a relation of direct reciprocity. In contrast, when exchanges are negotiated, each actor's outcomes depend on the *joint* actions of self and other, and the flow of benefits is always *bilateral*; each transaction produces an agreement that provides benefits (equal or unequal) for both actors.

Consequently, as table 1 shows, each form of exchange consists of a different configuration of the two dimensions: in negotiated exchange, benefits flow bilaterally and reciprocity is direct; in reciprocal exchange, benefits flow unilaterally but can be reciprocated directly; in generalized exchange, benefits flow unilaterally and reciprocity is indirect.

### The Causal Model

These differences in the structure of reciprocity affect the development of social solidarity through three intervening causal mechanisms: the structural risk of nonreciprocity, the expressive value conveyed by the voluntary act of reciprocity itself, and the relative salience of the cooperative or conflictual elements inherent in the mixed-motive structure of exchange (fig. 1). The first two mechanisms entail direct structural effects of reciprocity on social solidarity; the third affects social solidarity through intervening cognitions of the actors (their perceptions of relational conflict). Forms of exchange with indirect (rather than direct) reciprocity and

<sup>4</sup> Actors are *directly* dependent only on the single actor who can benefit them, but they are *indirectly* dependent on other actors in the network for maintaining the system of generalized exchange. While actors can “free ride” in a generalized exchange system, by receiving benefits without providing benefits for another, such free riding will in time cause the breakdown of the system. In generalized exchange, as in direct exchange, benefits received are contingent on benefits given; if A fails to give to B, then in time B will cease to give to C.

TABLE 1  
THE STRUCTURE OF RECIPROCITY IN THREE FORMS OF EXCHANGE

Form of Exchange	STRUCTURE OF RECIPROCITY	
	Direct vs. Indirect Reciprocity	Bilateral vs. Unilateral Flow of Benefits
Negotiated .....	Direct	Bilateral
Reciprocal .....	Direct	Unilateral
Generalized .....	Indirect	Unilateral

with unilateral (rather than bilateral) flow of benefits have *positive* effects on social solidarity, produced by *increasing* the risk of nonreciprocity, *increasing* the expressive value of the act of reciprocity, and *decreasing* the relative salience of conflict in the relationship.

The *risk of nonreciprocity* refers to the structural or situational potential for one actor to incur a net loss in exchange by giving benefits to an exchange partner and receiving little or nothing in return. Theoretically, all forms of exchange involve risk because the dependence of actors on one another makes them vulnerable to another's actions. The amount and kind of risk vary, however, with the structure of reciprocity. The risk of nonreciprocity is present only when exchange benefits flow unilaterally and actors make individual decisions about whether or not to reciprocate another's giving. When actors jointly negotiate bilateral agreements with binding terms, the risk of nonreciprocity is eliminated (although other kinds of risk may remain). Risk is also greater when reciprocity is indirect rather than direct, because actors are dependent on the actions of multiple others (whose giving they cannot directly reciprocate), with risk increasing in proportion to the length of the chain. Consequently, generalized exchange is riskier than reciprocal exchange, and reciprocal exchange is riskier than negotiated exchange. Because risk is a necessary condition for actors to demonstrate their trustworthiness to one another, these differences in risk should affect the development of trust, one of the key components of social solidarity. Acts of trust and attributions of trustworthiness can only be made in risky situations in which the partner has the opportunity either to exploit the actor or to behave in a trustworthy manner (Coleman 1990; Kelley and Thibaut 1978; Kollock 1994; Molm et al. 2000; Yamagishi and Yamagishi 1994). When actors demonstrate their trustworthiness in a context of risk, trust should increase; both structural risk and trustworthy behaviors are necessary for the development of trust.

The second causal mechanism, the *expressive value of reciprocity*, refers to the symbolic or communicative value attached to the *act* of reciprocity



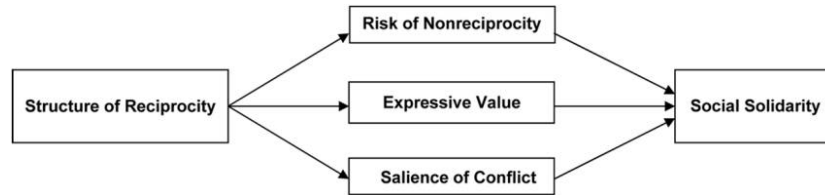


FIG. 1.—Causal model for the reciprocity theory of social exchange

itself, *over and above* the instrumental benefits produced by the partner's reciprocity (Molm et al. 2007). When reciprocity is uncertain and left to the discretion of the recipient, the act of reciprocity can convey expressive value by communicating regard for the exchange partner and the relationship and the willingness to invest in its continuation (Kollock and O'Brien 1992; Kranton 1996; Offer 1997). The structure of reciprocity directly affects the conditions necessary for this to occur. The bilateral flow of benefits in negotiated exchange, in which agreements always benefit both actors, makes reciprocity a taken-for-granted feature of exchange. But when benefits flow unilaterally, as they do in both reciprocal and generalized exchange, actors initiate exchange without knowing whether, when, or to what extent their giving will be reciprocated in the future. These questions are left to the discretion of the potential reciprocator, whose actions then convey expressive as well as instrumental value. Acts of *indirect* reciprocity carry additional expressive value. In the direct reciprocity of reciprocal exchange, the relationship unfolds as a series of individually performed, sequentially contingent acts, in which obligations are repeatedly created and repaid. But in the indirect reciprocity of generalized exchange, the giver is not repaying a direct obligation; participation in generalized exchange benefits another to whom the giver owes no debt. Consequently, the expressive value of reciprocity should be greatest in generalized exchange and least in negotiated exchange, with reciprocal exchange intermediate.

While the first two mechanisms *increase* solidarity, the third—the *salience of conflict* in the relation—reduces it. All exchange relations are “mixed-motive” relations in which actors' interests partially correspond and partially conflict; in any particular relation, one of these two “faces” of exchange—the cooperative face or the competitive face—may be more salient to the actors than the other. Heightened awareness of conflict increases sensitivity to inequalities in exchange (Deutsch 2000) and increases actors' tendencies to perceive the partner's behavior in a negative light (Hegtvedt and Killian 1999). The theory argues that awareness of the competitive, conflictual elements of exchange is most intense in the

bilateral transactions of negotiated exchange, where outcomes (when known) are more easily compared (Ekeh's "strict accounting" is possible), the relation of one actor's gain to another's loss is more direct and transparent, and the act of bargaining itself implies conflict (Molm et al. 2006). The unilateral acts of giving that comprise the structure of reciprocal and generalized exchange mute the inherent conflict in actors' interests by making it harder to compare outcomes and by making both the costs of exchange and any dissatisfaction with one's relative benefits from exchange less directly tied to the other actor. The indirect reciprocity of generalized exchange should further reduce the salience of conflict by removing *any* direct reciprocal relation between benefactor and recipient.

The joint effects of these three causal mechanisms should produce levels of solidarity that are ordered as follows: generalized indirect exchange > reciprocal direct exchange > negotiated direct exchange.<sup>5</sup> Risk primarily affects trust, but the other two mechanisms affect social solidarity more generally. These effects should be evident both in evaluations of others to whom the actor is directly connected in the dyadic relation or generalized network and in evaluations of the relationship or network as a social unit.

**The Role of Structural Power, Network Size, and Network Information**  
*Structural power.*—When direct exchange relations are embedded in larger exchange networks, structural dimensions of those networks—the availability of alternative partners, the relative value of exchange with alternative partners, the number of alternative partners—affect actors' relative power over one another (Emerson 1972*b*). Therefore, actors in direct exchange relations can be equal or unequal in power relative to one another, and their exchanges can produce equal or unequal benefits for each other. The study of power in exchange networks has been a central focus of contemporary work on social exchange (Cook and Emerson 1978; Markovsky, Willer, and Patton 1988; Skvoretz and Willer 1993), and the earlier work comparing the two direct forms of exchange was conducted under varying degrees of power imbalance (Molm et al. 2000, 2001).

In chain-generalized exchange networks, however, the unidirectional and collective nature of the exchange system makes power differences

<sup>5</sup> Previous work has established that each of the three mechanisms has an independent effect on the development of solidarity; our predictions here are based on the joint contribution of these independent effects. The three mechanisms may also interact with one another in ways that have not yet been established; for example, greater risk may enhance the expressive value of reciprocity. Such effects would not alter the predicted ordering of solidarity among the three forms of exchange, however.

unlikely; all actors in the chain occupy identical structural positions (Bearman 1997; Ekeh 1974). Because the conditions under which we compare the three forms of exchange must be equivalent, we therefore study all three in networks of equal structural power. This condition provides a conservative test of the predictions of reciprocity theory for direct forms of exchange, because the causal mechanisms in the theory should have *stronger* effects in relations of unequal power than in relations of equal power. Unequal power accentuates the effects of the structure of reciprocity, by making reciprocal exchange riskier (particularly for disadvantaged actors), by heightening the salience of conflict (particularly in negotiated exchange), and by increasing the expressive value of the partner's reciprocity (especially when the partner is advantaged). When actors are equal in power, all of these effects should be reduced.

First, equal power significantly reduces the risk of nonreciprocation in reciprocal exchange; when all actors in a network are equally dependent on one another, they are structurally indifferent between alternative partners. Consequently, reciprocity between A and B is more a problem of coordination than of differential interest; the probability that an actor will receive benefits from *some* other actor in the network on an exchange opportunity is 1.0. Structural risk remains—reciprocity is not assured—but actors in equal-power relations are less likely than actors in unequal-power relations to experience giving to another while receiving nothing in return. Second, when actors in negotiated exchanges are equal in power, their objective conflict is reduced (actors are equally interested in exchanging with each other), the expected terms of their agreements are equal, and making those agreements is likely to be easier, faster, and less conflictual. Consequently, the conflict in their relation is likely to be less salient. Finally, the greater uncertainty of reciprocity in unequal-power relations should increase the expressive value of a partner's acts of voluntary reciprocity; when actors are equally dependent on one another, expressive value is still conveyed, but its strength is likely to be muted.

Thus, when compared under equal-power conditions, the differences in solidarity between the two direct forms of exchange on solidarity are expected to be *smaller* than the differences in trust and affective regard found between negotiated and reciprocal exchange in previous studies (Molm et al. 2000, 2003). Power does not affect the primary focus of this study—the comparison between direct and indirect forms of exchange—and the logic of the theory still predicts the same ordering of solidarity across the three forms of exchange: generalized exchange > reciprocal exchange > negotiated exchange. Under equal power, however, the difference between generalized and direct forms of exchange should be greater than the difference between the two direct forms of exchange.

*Network size.*—We compare the three forms of exchange in two different

network structures (see fig. 1). Both are small, closed networks, with either three or four actors. While we expect the predicted ordering of the form of exchange to be robust across both networks, their difference in size and associated characteristics has interesting implications for networks of direct and indirect exchange that may modify some differences between them. Size affects risk and behaviors associated with trustworthiness in networks of both direct and generalized exchange, but through different mechanisms.

In chain-generalized exchange, the effect of increasing the number of actors in the network is purely one of size: each additional actor increases the length of the chain and the length of the indirect path through which reciprocation occurs. As the chain length increases, the risk of nonreciprocity also increases. If, for example, the probability of any actor's reciprocating exchange is .8, then the probability that A's giving to B is indirectly reciprocated by another actor is .64 in a three-actor network ( $.8 \times .8$ ) and .51 in a four-actor network ( $.8 \times .8 \times .8$ ).<sup>6</sup>

In direct forms of exchange, the difference between the three- and four-actor networks is not only a function of size, but of the structural opportunity for pairs of actors to form stable commitments. Four-actor closed networks potentially allow stable behavioral commitments to form between pairs of actors; in the three-actor networks, the third actor always provides an inducement to break any commitment that forms between the other two actors. Because behavioral commitments signal trustworthiness (Molm et al. 2000), these differences not only increase structural risk in the three-actor networks, they also promote behaviors that should contribute to attribution of the partner's trustworthiness in the four-actor networks, and the partner's *un*trustworthiness in the three-actor networks.

If indirect reciprocity in generalized exchange, and behavioral commitments in direct exchange, do vary with network size, this logic implies an interaction between network size and the direct or indirect structure of reciprocity. In direct forms of exchange, social solidarity—particularly trust, which is most affected by risk and indicators of trustworthiness—should be greater in the four-actor than in the three-actor networks; in indirect (generalized) exchange, solidarity should be greater in the three-actor than in the four-actor networks. Whether behavioral commitments will form in the equal-power networks of this study, however, is more questionable. Such commitments are more common when power differences encourage disadvantaged actors to seek stable relations with their

<sup>6</sup> If actors give noncontingently (regardless of their benefactor's giving), the length of the chain should not matter; we assume, however, that noncontingent giving will not be sustained.

more valuable, advantaged partners (Molm et al. 2000; Yamagishi, Cook, and Watabe 1998); in equal-power networks, the structural equivalence of alternative partners does not promote commitments to particular others.

*Network information.*—Reciprocity theory makes no assumptions about actors' knowledge of the network structure beyond their immediate connections. Just as power-dependence theory assumes that structural power will affect behavior regardless of whether actors are aware of the larger network structure (Cook and Emerson 1978), reciprocity theory assumes that the structure of reciprocity will affect solidarity regardless of whether actors are aware of the size and shape of the larger network in which they are embedded. The causal mechanisms that link the two structural dimensions of reciprocity to solidarity do not depend on that knowledge; consequently, social solidarity should be as likely to develop when actors have restricted information about the network (i.e., knowledge of only their own direct connections) as when they have full information about the size and shape of the network structure.

This assumption is a particularly strong and important one for generalized exchange networks. In direct exchange networks, actors are expected to form attachments to partners and to dyadic relationships—targets and social units about which they have information even in the absence of information about the network as a whole. Generalized exchange systems, however, are potentially a different matter. If actors have information only about their immediate connections—their potential recipient and their potential benefactor—*the structure of indirect reciprocity is unknown*. Actors might be connected in a chain of indirect reciprocity (of unknown length), or they might be in a far more diffuse network of “pure” generalized exchange (Takahashi 2000). In contrast, if actors have full information about the structure of a chain-generalized exchange network, they know they are linked in a cycle of indirect reciprocity whose continuation depends on each actor's participation. That knowledge alone could potentially influence both the establishment of generalized exchange and the development of bonds of solidarity, through cognitive processes that are not a part of reciprocity theory.

Therefore, to eliminate knowledge of the network structure as a source of solidarity, we first compare all three forms of exchange under conditions of restricted information, in which actors are aware only of their own direct connections. This means that actors are unaware of the size of the network (which we vary) and unaware that the networks are closed. Then, to test whether network information does affect the development of solidarity in generalized exchange (which reciprocity theory does not predict), we study the generalized exchange networks under conditions of both full and restricted network information.

Comparison with Other Theories

Reciprocity theory's predictions are consistent with the classic anthropological prediction that generalized exchange produces greater solidarity than direct exchange, but go beyond the classic comparison to predict differences between reciprocal and negotiated forms of direct exchange as well. The theory's predictions are *opposite*, however, to those of a more recent theory: Lawler's (2001) affect theory of exchange, which builds upon Lawler and Yoon's studies of relational cohesion in negotiated exchanges (Lawler and Yoon 1993, 1996, 1998).

Lawler and Yoon argue that repeated, successful negotiations produce positive emotions that actors attribute to the social unit, thus increasing perceptions of relational cohesion. Affect theory extends this work by proposing (among other things) that variations in the *jointness of the exchange task* across different forms of exchange should affect the sense of shared responsibility for task success or failure, and thus affect the likelihood that actors will attribute their emotions to the social units that produced the task outcomes. Because jointness of task is highest in negotiated exchange and lowest in generalized exchange, affect theory predicts that perceptions of shared responsibility, global emotions, attribution of emotions to the relationship (direct exchange) or group (indirect exchange), and the consequent affective attachments to the social unit, should be ordered as follows: negotiated direct exchange > reciprocal direct exchange > generalized indirect exchange. Lawler (2001, pp. 338–39) proposes that generalized exchange, in particular, “has an impersonal character,” and that despite the collective nature of a chain-generalized exchange system, it “entails separable individual contributions to the collective endeavor and . . . is not likely to endogenously generate a strong sense of shared responsibility for exchange. The collective or group effects occur on an objective, but not a subjective, level.”

It is with these subjective effects—actors' *perceptions* and *feelings* of social solidarity—that our analysis is concerned. While our aim is to test the extension of reciprocity theory to generalized exchange, many of the conditions under which we conduct our study are also appropriate for affect theory and allow us to speak to at least some of its claims. The equal-power conditions of our study, in particular, are favorable to affect theory; Lawler and Yoon (1998) have found that the endogenous process in relational cohesion (especially the relation between frequent exchange and positive emotions) only occurs in equal-power networks. Consequently, this study offers an opportunity to compare, for the first time, the predictions of reciprocity theory to those of affect theory for the relative ordering of generalized versus direct forms of exchange on solidarity.

## METHOD

## Experimental Design and Basic Procedures

We test the predictions of reciprocity theory in a laboratory experiment that compares all three forms of exchange—negotiated direct, reciprocal direct, and chain-generalized indirect—in both three- and four-actor closed networks. The setting was designed to meet the traditional scope conditions of social exchange theory (Molm and Cook 1995) and our analysis: actors are dependent on one another for valued outcomes (operationalized as money), they are recruited on the basis of their interest in acquiring more of those outcomes, and they engage in repeated exchanges with one another over time.

Our experimental design, shown in table 2, consists of two overlapping factorials, conducted as a single large experiment. Our main experiment crossed the form of exchange (negotiated, reciprocal, generalized) with network size (three or four actor) in a  $3 \times 2$  factorial. All conditions in this set of manipulations were conducted under restricted network information, in which subjects were informed only of their immediate partners—the actors to whom they were connected—and of their potential benefits from those partners. Under restricted information, subjects knew neither the size nor the shape of the network. Generalized exchange networks were also studied under conditions of full network information, thus allowing us to analyze the generalized exchange conditions as a separate  $2 \times 2$  factorial, crossing network information (full or restricted) with network size (three or four actor). Ten networks were run in each of the negotiated and reciprocal exchange conditions; in the generalized exchange conditions—which had not previously been studied and where greater within-condition variances were expected—twelve networks were run in each condition. A total of 308 undergraduate students were randomly assigned to conditions and to positions within networks. All networks consisted of same-sex subjects, with gender balanced within conditions for control purposes.<sup>7</sup>

Subjects participated in one of the networks shown in figure 2 and engaged in one of the three forms of exchange to earn money. All relations in the networks were of equal value, and all actors were in positions of equal structural power. To provide the opportunity for social solidarity to develop, subjects remained in the same network positions throughout the experiment and interacted repeatedly with the same partners. All interaction occurred through computers; subjects were seated in isolated rooms and never met each other.

<sup>7</sup> Preliminary analyses found no effects of gender, and gender is omitted from the analyses reported here.

TABLE 2  
THE EXPERIMENTAL DESIGN: TWO OVERLAPPING FACTORIALS (3 × 2 AND 2 × 2)

	3 × 2 FACTORIAL		2 × 2 FACTORIAL	
	Reciprocal Exchange	Negotiated Exchange	Generalized Exchange	Generalized Exchange
	Three-actor network ...	RI	RI	RI
Four-actor network ....	RI	RI	RI	FI

NOTE.—RI=restricted information; FI=full information.

Following detailed instructions and practice trials, subjects participated in a series of exchange opportunities. At the end of each opportunity, they were informed about the source and amount of any points gained, and their total earnings (points × cents) were cumulated and shown on their computer screens. Subjects were not informed in any of the conditions about the amounts of money that the other participants received from exchanges (either with them or with others), about the outcomes of their partners' exchanges with other actors in the networks, or about their partners' cumulative earnings. These restrictions on subjects' information, which are common in the power-dependence tradition of social exchange (Cook and Emerson 1978; Lawler and Yoon 1996), are designed to reduce actions based on motives of competition or equity.<sup>8</sup>

We varied the number of exchange opportunities across the different forms of exchange to adjust for structural differences in opportunities for exchange between the three-actor negotiated and all other networks, and for the longer time required for each negotiated exchange, compared to each reciprocal or generalized exchange. First, because only two actors could make an agreement on each exchange opportunity in the three-actor negotiated network, the structural opportunity to engage in exchange in that network was only two-thirds that of the four-actor negotiated network. To control for this difference, subjects exchanged for 100 opportunities in the three-actor network (giving each actor an expected value of 66.67 opportunities) and for 68 opportunities in the four-actor network (an even number was used to allow an equal number of opportunities in each of four trial blocks). Second, because each negotiated exchange took two to three times as long as each reciprocal exchange and involved multiple behaviors, subjects in the reciprocal and generalized exchange

<sup>8</sup> Actions based on motivations of either competition (doing better than another) or fairness (equalizing benefits across actors) are contrary to our scope assumption that actors seek to increase their *own absolute* outcomes, not their outcomes *relative* to those of others.



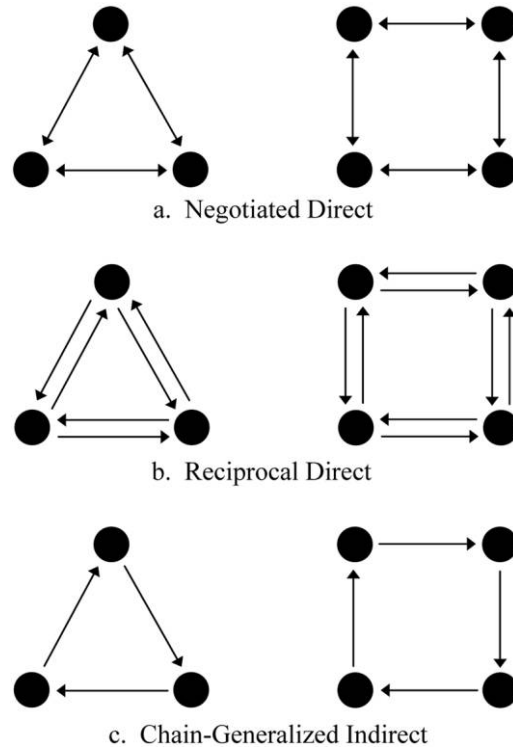


FIG. 2.—The exchange networks in the experiment

networks exchanged for 200 opportunities to roughly equate the amount and time of interaction across the three forms of exchange. Finally, the monetary value of points was adjusted to compensate for these differences: subjects in negotiated exchange conditions received three cents per point; subjects in reciprocal and generalized exchange conditions received one cent per point. As a result, subjects in all conditions earned approximately the same amount for comparable exchange behaviors.

Manipulations

*The form of exchange.*—Three different exchange settings were created to manipulate the form of exchange: negotiated direct, reciprocal direct, or chain-generalized indirect. The settings were designed to be as comparable as possible to one another on all dimensions other than their defining differences.

In the *negotiated exchange* setting, subjects negotiated the division of

a fixed amount of benefit (16 points) on each exchange opportunity, and each opportunity consisted of up to five rounds of negotiation. On each round, all actors in the network simultaneously made offers to both of their partners. After the first round, actors could accept another's offer, repeat their last offer, or make a counteroffer. Negotiations continued until all potential agreements were made (one agreement in the three-actor network; two agreements in the four-actor network) or the five rounds were up. As soon as an agreement was reached, both actors received the amounts they had agreed upon (thus, agreements were binding). Subjects knew the range of points they could request from agreements and that, in general, the more they received, the less the other person received. They did not know that a fixed amount of profit was divided, however, nor did they know how many points the other subject received from an agreement. Actors made offers by *requesting* the number of points they wanted to receive; an actor's *request* for points was then converted, by the computer, into an *offer* of the remaining points for the other.

In the *reciprocal exchange* setting, each actor in the network could give a fixed number of points (eight points, equal to one-half the total points that subjects in the negotiated setting could divide on each opportunity) to one of his or her partners on each exchange opportunity or, as a third choice, could give points to no one. (The latter option was included for comparability to the generalized exchange setting, described below.) Giving points to a partner added to the partner's total points without subtracting from the subject's own points. As in the negotiated exchange conditions, subjects knew only the number of points they could receive from others, not the number of points they could give to others. On each opportunity, all subjects simultaneously and independently chose a partner to give points to (or chose to give to neither), without knowing whether or when the other would reciprocate. Subjects were then informed that each of their partners either added to the subject's earnings or did not act toward the subject, and their cumulative points were updated.

In the *chain-generalized exchange* setting, each actor could *give* a fixed number of points to one actor in the network and *receive* a fixed number of points from a different actor. The number of points given and received was eight, as in the reciprocal exchange conditions. As in the direct exchange conditions, subjects knew only the number of points they could receive from another, not the number of points they could give to another. Because each actor in a chain-generalized network is linked to one potential benefactor and one potential recipient (see fig. 2), subjects could choose only whether or not to give points to their potential recipient on each exchange opportunity. All subjects in the network made these choices simultaneously and independently, without knowing what choices other subjects made. Subjects were then informed that their potential benefactor

either added to the subject's earnings or did not act toward the subject, and their cumulative points were updated.

*Network size.*—Network size was manipulated by comparing the three-actor and four-actor closed networks shown in figure 2. In all networks, each actor was connected to two other actors in the network, thus giving them experience in exchange with two other network members. To assure that actors participated in only one exchange (direct or indirect) on each opportunity in all networks, relations in the direct forms of exchange were negatively connected: in the negotiated exchanges, making an agreement with one partner precluded an agreement with another partner on that opportunity; in the reciprocal exchanges, initiating exchange with one partner precluded initiating exchange with another on that opportunity. In the generalized exchange network, each “exchange” necessarily involved interacting with two others (giving to one, and receiving from another), but, as in the direct exchange networks, an actor could participate in only one exchange on each opportunity.

*Variations in generalized exchange.*—The generalized exchange networks were studied under conditions of both *full* network information and *restricted* network information. In the full information conditions, a drawing of the exchange network was displayed on subjects' screens, showing the structure of the chain-generalized exchange network. In the restricted information conditions, no figure was displayed and subjects were told only *to whom* they could give points and *from whom* they could receive points. They also knew that all other participants could receive points from one person and give to another, but they did not know the number of participants or that all participants were linked in a closed, chain-generalized network. Thus, subjects with full information knew the extent to which maintenance of the generalized exchange system depended on the participation of all actors in the network; those with restricted information did not.

In addition to the four generalized exchange conditions shown in table 2 (with full or restricted information, and a three- or four-actor network), a fifth condition was conducted as a follow-up to the main experiment. This condition imposed an explicit *opportunity cost* on acts of generalized exchange, comparable in some degree to the opportunity costs involved in choosing among alternative partners in reciprocal direct exchange. It was included to rule out the difference in cost as a possible explanation for any differences in solidarity between generalized and reciprocal direct exchange. Rather than choosing to give or not give points to a potential recipient, subjects in the new condition chose either to give points to their potential recipient or to give two points to self; thus, subjects who chose to give to their potential recipient in the generalized exchange network

incurred an opportunity cost of two points.<sup>9</sup> While we expected this cost to reduce the overall frequency of giving in the new condition, we did not expect it to change the direct effect of generalized exchange on solidarity. Twelve networks, with 36 additional subjects, were run in this condition, which was otherwise comparable to the three-actor generalized exchange condition with restricted information.

### Measures

*Social solidarity.*—At the conclusion of the experiment, subjects responded to a series of seven-point bipolar semantic differential scales measuring evaluations of their exchange partners and their social units: in the negatively connected direct exchanges, the social unit is the dyadic relationship; in the indirect exchanges, the social unit is the network of all participants. From these items, we derived measures of four dependent variables that tap different dimensions of the central concept of social solidarity: trust, affective regard, perception of social unity, and feelings of commitment. All measures range in value from one to seven, with higher values indicating stronger feelings of trust, more affective regard, greater social unity, and stronger commitment.

Lawler (2001) has argued that although both reciprocal and negotiated exchanges may produce positive affect toward the *other actor*, negotiated exchanges are more likely than reciprocal to produce positive affect directed toward the *social unit*. To examine whether different patterns are in fact observed for these different targets, not only in the two direct forms of exchange but in generalized exchange, we include measures of both. For trust and affective regard, the target of evaluation is *another actor*: the exchange partner in the direct exchange relations, and the subject's benefactor in the indirect exchange relations.<sup>10</sup> For perception of social

<sup>9</sup> The probabilities involved in the two opportunity costs—the one we created for generalized exchange and the typical opportunity cost of reciprocal forms of direct exchange—are very different, of course: giving points to self assures gain, while the return from giving points to a direct exchange partner depends on the partner's reciprocity. For this reason we kept the number of points that could be given to self low. As pretesting indicated, the option of giving even one or two points to self significantly reduced the frequency of giving to the subject's potential recipient.

<sup>10</sup> We also conducted analyses of trust and affective regard with an alternative scale for the generalized exchanges, one that averaged subjects' evaluations of both their benefactor (the person who gave points to them) and their recipient (the person to whom they gave points). Subjects' evaluations of their two "partners" were highly correlated ( $R = .77$  trust and  $.82$  for affective regard;  $P < .001$ ), and analyses of both scales (our primary scale based on evaluations of the benefactor only, and the alternative scale based on evaluations of both the benefactor and the recipient) produced the same pattern and significance of results.

unity, the target of evaluation is the *social unit*: the dyadic exchange relationship in the direct exchange networks, and the generalized exchange system in the indirect exchange networks. For commitment, both targets of evaluation—other and social unit—are combined in the measure.<sup>11</sup>

We measured *trust* in the partner with a four-item scale. One item asked subjects how much they trusted the partner (very little/very much); the other three items asked subjects for their impression of the partner as untrustworthy/trustworthy, unreliable/reliable, and undependable/dependable. With responses to the four items averaged, the resulting trust scale has an alpha reliability of .93.

We measured *affective regard* for the partner with a four-item scale, composed of one item asking subjects to describe their general feelings toward the partner as negative/positive, and three items asking subjects for their impression of the partner as awful/nice, bad/good, and uncooperative/cooperative. With responses to the four items averaged, the resulting scale has an alpha reliability of .96.

We measured *social unity* with a four-item scale, based on subjects' descriptions of their relationship with a dyadic exchange partner (direct exchange) or with all of the other participants (indirect exchange) as divided/united, adversaries/partners, self-oriented/team-oriented, coming apart/coming together. With responses to the four items averaged, the resulting scale has an alpha reliability of .96.

We measured *feelings of commitment* with a two-item scale, one assessing subjects' feelings of commitment (uncommitted/committed) to another actor (either the direct exchange partner or the benefactor in indirect exchange) and the second describing their relationship with the exchange partner (direct exchange) or the other participants (indirect exchange) as uncommitted/committed. With responses to the two items averaged, the resulting scale has an alpha reliability of .85.

In addition to these core semantic differential measures of our four dimensions of social solidarity, we created a multiple-choice question that required subjects to select one of four statements that *best described* how they thought about themselves and the other participants during the ex-

<sup>11</sup> Measures based on evaluations of *another actor* were derived from subjects' average evaluations of their two partners in the direct forms of exchange, and from subjects' single evaluation of their benefactor—the person who gave to them—in the generalized exchanges. Measures based on evaluations of the *social unit* were derived from subjects' average evaluations of their two relationships in the direct forms of exchange, and from subjects' single evaluation of their relationship with the other participants in the chain-generalized exchange. Then, for all measures, we averaged the evaluations of all actors in the network (all of whom were in structurally equivalent positions) to obtain our final network-level measures of trust, affective regard, social unity, and commitment.

periment: “We were competitors, working against each other”; “We were separate individuals, each working for ourselves”; “We were separate individuals, but working together”; or “We were a group, a team, working together.” These four responses represent distinct levels of perceived interdependence between actors. We analyze responses to this question to examine the extent to which the subjects, who began the experiment as strangers interested in making money, came to perceive themselves as a collective group.

*Salience of conflict.*—The degree to which the competitive, conflictual elements of exchange were salient to the subjects was tapped by two semantic-differential items. One asked subjects, “On the whole, do you think your interests were in *conflict* with those of other participants in the experiment, or were your interests in *agreement*?” (agreement/conflict); the other asked, “Would you say that the motives of the other participants in the experiment were generally *cooperative* or *competitive*?” (cooperative/competitive). With responses to the two items averaged, the resulting *salience of conflict* scale has an alpha reliability of .85 and ranges in value from 1 (low salience of conflict) to 7 (high salience of conflict).

*Frequency of exchange.*—Numerous studies have found that higher frequencies of exchange produce greater trust, more positive affect for the partner, and stronger cohesion, and that exchange frequency, in turn, is affected by the structure of exchange (e.g., Lawler and Yoon 1993, 1996; Molm et al. 2000). Because exchange frequency potentially varies across the three forms of exchange and the two network structures in our experiment, we conduct all analyses both with and without controlling for frequency as a covariate before estimating effects of the manipulated variables on social solidarity. We measure the frequency of exchange as the number of agreements (negotiated) or acts of giving (reciprocal and generalized) divided by the number of opportunities for exchange; this variable has a potential range of 0–1.0. In the negotiated exchange conditions, subjects had the opportunity to make agreements on 67–68 opportunities; in the reciprocal and generalized exchanges, subjects had the opportunity to give (and receive) benefits on 200 opportunities. Because all actors occupy equivalent positions in these equal-power networks, measures of frequency are averaged across actors and relations in the network. Frequencies *less* than 1.0 represent failures to agree in the negotiated exchanges, choices to give to neither partner in the reciprocal exchanges, and choices to not give to an actor’s designated recipient in the generalized exchanges.

## RESULTS

## The Form of Exchange and Social Solidarity

We first analyze the results of the main portion of our experiment: the  $2 \times 3$  factorial crossing the form of exchange (negotiated, reciprocal, and generalized) with network size (three and four actor) under conditions of restricted network information. To ensure that all estimates are evaluated with the same power, we use an  $N$  of 10 in all conditions; in the two generalized exchange conditions, the first 10 networks run were used for the analyses. Table 3 reports the means and standard deviations for our measures of solidarity (trust, affective regard, social unity, and commitment) and for our measures of salience of conflict and exchange frequency. We first discuss our results for exchange frequency.

*Exchange frequency.*—As expected, standard deviations are higher in the generalized than in the direct exchange conditions for virtually all variables, reflecting the more variable patterns of giving in the generalized exchange networks. Exchange frequencies in the generalized conditions range from .41 to 1.00, compared with .76 to 1.00 in the direct exchange conditions. The distribution of exchange frequencies in the generalized exchange conditions supports the expectation that, once established, such systems should be remarkably robust, but that establishment is difficult: 7 of the 20 generalized exchange networks had perfect exchange frequencies of 1.0 (compared to only 1 of the 20 reciprocal exchange networks), an eighth, .99, and a ninth, .95. After that, however, the frequency of exchange drops to the mid-.80s (four cases), then to the low .70s (three cases), the low .60s (two cases), and finally to .50 or less (two cases). All of these latter cases show considerable variability in giving over time, as well.

Frequencies for the reciprocal and negotiated exchange conditions are not only more constrained in range, but more evenly distributed across the range. Giving actors in reciprocal exchange the option of giving benefits to neither partner reduced exchange frequency somewhat in these networks, but not as much as in the generalized exchange networks. The resulting heterogeneity of variances *across* the three forms of exchange requires conservative estimates of any comparisons *between* generalized exchange and either or both of the direct exchange conditions (Keppel and Wickens 2004); thus, for comparisons between generalized and direct exchange conditions, only  $P$ -values less than .01 will be considered statistically significant.

As expected, the frequency of exchange is significantly correlated with all of our dependent variables, with correlations ranging from .43 to .49 ( $P < .001$ ). In addition, frequency varies with the form of exchange, with frequency highest for negotiated exchange (particularly in the three-actor

TABLE 3  
 UNADJUSTED MEANS AND SDS OF EXCHANGE OUTCOMES, BY FORM OF EXCHANGE AND NETWORK SIZE, RESTRICTED  
 INFORMATION (N = 60)

Subjects' Evaluations	NEGOTIATED			RECIPROCAL			GENERALIZED		
	Three Actor	Four Actor	Four Actor	Three Actor	Three Actor	Four Actor	Three Actor	Three Actor	Four Actor
Social solidarity:									
Trust .....	4.36 (.66)	4.14 (.29)	4.02 (.20)	4.02 (.20)	4.34 (.36)	4.90 (.94)	4.90 (.94)	5.00 (1.25)	5.00 (1.25)
Affective regard .....	4.60 (.64)	4.25 (.32)	4.43 (.29)	4.43 (.29)	4.65 (.39)	5.47 (1.09)	5.47 (1.09)	5.18 (1.37)	5.18 (1.37)
Social unity .....	4.13 (.67)	3.74 (.26)	3.96 (.20)	3.96 (.20)	4.21 (.34)	5.22 (1.42)	5.22 (1.42)	4.73 (1.44)	4.73 (1.44)
Commitment .....	4.01 (.92)	3.52 (.67)	3.96 (.45)	3.96 (.45)	4.18 (.53)	4.95 (1.13)	4.95 (1.13)	4.44 (1.34)	4.44 (1.34)
Salience of conflict .....	3.75 (.94)	4.90 (.30)	3.67 (.73)	3.67 (.73)	3.28 (.52)	2.63 (1.36)	2.63 (1.36)	2.95 (1.73)	2.95 (1.73)
Exchange frequency <sup>a</sup> .....	1.00 (.00)	.88 (.06)	.89 (.07)	.89 (.07)	.90 (.06)	.87 (.16)	.87 (.16)	.79 (.21)	.79 (.21)

NOTE.—SDs in parentheses.  
<sup>a</sup> Frequency of transactions/giving, divided by opportunities for transactions/giving.



networks, where an agreement was made on every opportunity; see table 3) and lowest for generalized exchange ( $F[2,54]$  for form = 4.56;  $P < .02$ ). In other words, the ordering of exchange frequency is in the opposite direction of the predicted ordering of feelings of solidarity; thus, any indirect effects of exchange form on solidarity, through frequency, will tend to suppress the direct effects of exchange form in which we are interested.

*Social solidarity.*—We analyze the effects of the form of exchange on all four measures of social solidarity—trust, affective regard, social unity, and commitment—both with and without controlling for exchange frequency. Entering exchange frequency as a covariate in the analyses allows us to estimate the direct effects of our experimental manipulations on solidarity, independent of their indirect effects through exchange frequency. These analyses are summarized in table 4.

The results are consistent and straightforward: the form of exchange has a significant main effect on all four dependent variables, regardless of whether its effect is estimated before or after controlling for exchange frequency (controlling for frequency increases the strength of the effect). The effect is strongest on perceived social unity, which arguably best captures the meaning of solidarity. Contrasts (summarized in the last row of table 4) test for the predicted differences among the three forms of exchange, comparing generalized with reciprocal exchange, and reciprocal with negotiated exchange.<sup>12</sup> As they show, with or without controlling for frequency, generalized exchange produces significantly greater trust, affective regard, perceived social unity, and feelings of commitment than reciprocal direct exchange. The two forms of direct exchange, however, differ significantly from each other on three of the four measures—affective regard, social unity, and commitment—only after exchange frequency is controlled. They do not differ significantly on trust. Remember that trust is the dimension of solidarity most affected by risk, and that equal power significantly reduces the risk of nonreciprocation in reciprocal exchange.

The graphs in figure 3, which show the adjusted means (after controlling for exchange frequency) for the social solidarity measures, summarize these relations. The means consistently support the ordering predicted by reciprocity theory: on all measures of solidarity, generalized exchange > reciprocal exchange > negotiated exchange. As expected, the differences between generalized exchange and either form of direct exchange are

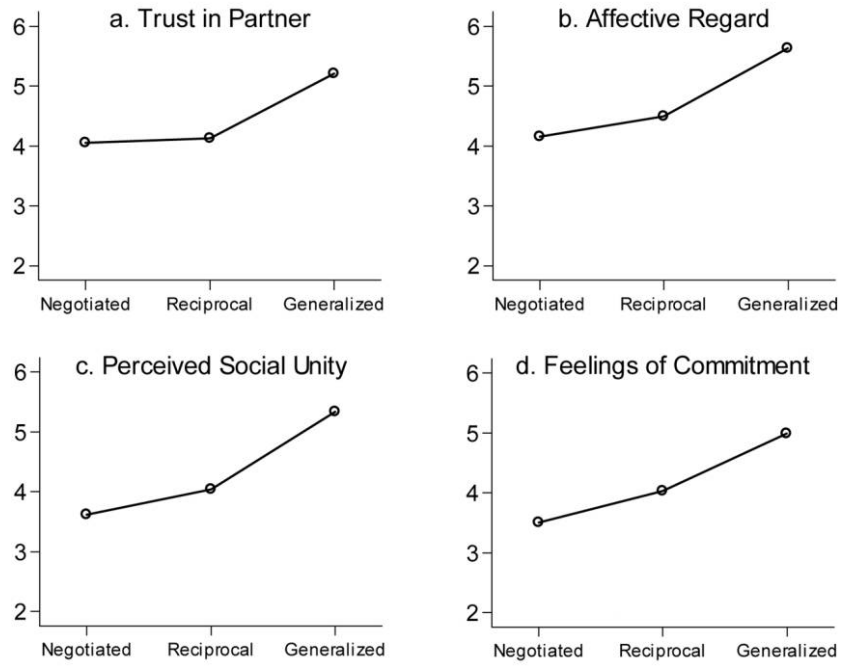
<sup>12</sup> Because reciprocity theory predicts a particular ordering of the three forms of exchange on social solidarity (generalized > reciprocal > negotiated), we report contrasts comparing generalized with reciprocal exchange and reciprocal with negotiated exchange. The results we obtain, however, are entirely consistent with orthogonal contrasts comparing generalized exchange with both direct exchange conditions, and the two direct exchange conditions with each other.

TABLE 4  
*F*-RATIOS FOR ANALYSES OF VARIANCE AND COVARIANCE ON SOCIAL SOLIDARITY FOR ALL FORMS OF EXCHANGE (*N* = 60)

Source	TRUST		AFFECTIVE REGARD		SOCIAL UNITY		COMMITMENT	
	ANOVA <i>F</i> (1,54)	ANCOVA <i>F</i> (1,53)	ANOVA <i>F</i> (1,54)	ANCOVA <i>F</i> (1,53)	ANOVA <i>F</i> (1,54)	ANCOVA <i>F</i> (1,53)	ANOVA <i>F</i> (1,54)	ANCOVA <i>F</i> (1,53)
Covariate:								
Frequency .....		55.87***		71.52***		88.98***		39.69***
Manipulated variables:								
Exchange form (F) .....	7.00**	28.91***	7.45***	36.78***	8.00***	45.38***	5.56**	20.68***
Network size (S) .....	.13	6.55*	.47	1.77	.85	1.35	1.25	.11
F × S .....	.72	.13	.80	.10	1.01	.53	1.08	.29
Contrasts for form <sup>a</sup> .....	G>R*** R=N	G>R*** R=N	G>R*** R=N	G>R*** R>N*	G>R** R=N	G>R*** R>N***	G>R* R=N	G>R*** R>N***

<sup>a</sup> G = generalized; R = reciprocal; N = negotiated. Contrasts test predicted differences between ordered pairs of conditions (one-tailed tests).  
 \* *P* < .05.  
 \*\* *P* < .01.  
 \*\*\* *P* < .001.

### MEASURES OF SOCIAL SOLIDARITY



### SALIENCE OF CONFLICT

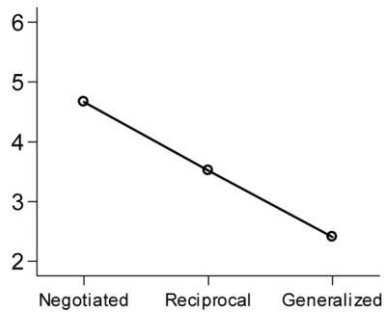


FIG. 3.—Relations between the form of exchange and measured variables: adjusted means, controlling for exchange frequency.

greater than the differences between the two forms of direct exchange in the equal-power networks of this experiment.

The sole effect of network size is a modest main effect on trust that is significant only after controlling for exchange frequency, showing greater adjusted mean trust in four-actor than in three-actor networks (table 4). The predicted interaction between network size and exchange form on trust is not supported; in particular, the shorter three-actor chains of generalized exchange did not produce greater trust even though the frequency of exchange was somewhat greater (but not significantly so) in these networks. Instead, these results show the robustness of the form of exchange on solidarity in networks that offer different opportunities for forming behavioral commitments (in direct exchange) and for experiencing nonreciprocity (in indirect exchange). In particular, the results for generalized exchange support Yamagishi and Cook's (1993) finding that network size has little effect on the frequency of chain-generalized exchange, and extend it to feelings of solidarity.

Analyses of variance and covariance on the salience of conflict, a cognition that plays a key causal role in the theory's logic, are shown in table 5. As the adjusted means in figure 3 show, the salience of conflict declines as we move from negotiated to reciprocal to generalized exchange. Differences among the three forms of exchange are significant either with or without controlling for the frequency of exchange, but they become stronger when frequency is controlled (table 5). Network size again has no effect. These results provide support for the one causal mechanism of reciprocity that operates through cognition rather than structure. As expected, however, the salience of conflict in negotiated exchange, while greater than in either reciprocal or generalized exchange, is substantially lower than in previous studies of unequal power (Molm et al. 2006). In these equal-power relations, actors made agreements that, on average, gave equal benefits to both, and they reached these agreements quickly (averaging less than two negotiation rounds per agreement).

Finally, we analyze subjects' perceptions of their relationship to the other participants: as competitors, as separate individuals working either alone or together, or as a group/team. Table 6 reports the total number of subjects choosing each of the four options and the odds that subjects in each of the three forms of exchange chose that option. Numbers above 1.0 represent odds greater than chance; numbers below 1.0 represent odds less than chance. For subjects in the negotiated exchange conditions, the odds *decrease* as we move from competitors to collaborators; for subjects in the generalized exchange conditions, the odds *increase*—these participants are 2.5 times more likely than would be predicted by chance to describe themselves as a "group." Subjects in the reciprocal exchange condition are intermediate. As the *N*'s indicate, the two "separate indi-

Generalized Exchange

TABLE 5  
*F*-RATIOS FOR ANALYSES OF VARIANCE AND COVARIANCE ON SALIENCE OF  
 CONFLICT FOR ALL FORMS OF EXCHANGE (*N* = 60)

Source	ANOVA <i>F</i> (1,54)	ANCOVA <i>F</i> (1,53)
Covariate:		
Frequency .....		58.39***
Manipulated variables:		
Exchange form (F) .....	10.71***	40.78***
Network size (S) .....	1.75	.08
F × S .....	2.70	1.34
Contrasts for form <sup>a</sup> .....	G>R*	G>R***
	R>N*	R>N***

<sup>a</sup> G = generalized; R = reciprocal; N = negotiated. Contrasts test predicted differences between ordered pairs of conditions (one-tailed tests).

\* *P* < .05.

\*\* *P* < .01.

\*\*\* *P* < .001.

viduals” options are the most common response choices in all conditions. In the negotiated exchange conditions, the modal response was “separate individuals, working for ourselves” (51.4% of subjects chose this option); in the reciprocal exchange conditions, the modal response was “separate individuals, but working together” (58.6% chose this option). In the generalized exchange conditions, where variability is greater, subjects were split fairly evenly between these two options (41.4% chose “separate/working for ourselves,” and 42.9% chose “separate/working together”).

Generalized Exchange

These analyses clearly support the prediction that indirect reciprocity generates greater feelings of social solidarity than forms of exchange with direct reciprocity. We next examine the generalized exchange networks in greater depth, asking whether the solidarity that generalized exchange produces is influenced by (a) variations in network information (full or restricted) and (b) imposition of a direct cost to self for giving to another.

*Network information.*—Table 7 presents the means and standard deviations of the same variables shown in table 3, but for the four generalized exchange conditions in the 2 × 2 factorial of our larger experiment, crossing the two lengths of chain-generalized exchange (three actor and four actor) with full or restricted information about the size and shape of the network. Analyses of variance and covariance were conducted on all variables (parallel to those in the previous analyses), using all 12 cases in each of the conditions (*N* = 48). As expected, network information has few effects;

TABLE 6  
 PERCEIVED INTERDEPENDENCE: DISTRIBUTION OF RESPONSES AND ODDS OF SUBJECTS'  
 CHOOSING EACH OF FOUR RESPONSE OPTIONS, BY FORM OF EXCHANGE

Response Choices	N <sup>b</sup>	ODDS OF CHOOSING RESPONSE <sup>a</sup>		
		Negotiated	Reciprocal	Generalized
Competitors, working against each other .....	13	1.62	1.15	.23
Separate individuals, work- ing for ourselves .....	89	1.21	.81	.98
Separate individuals, but working together .....	96	.78	1.28	.94
Group, a team, working to- gether .....	12	.50	.00	2.50

<sup>a</sup> Numbers above 1.0 represent odds greater than chance; numbers below 1.0 represent odds less than chance. Odds in each row sum to 3.00.

<sup>b</sup> Responses of the individual subjects (210 total) in the 60 networks.

consequently, we summarize the results of the analyses in the text rather than in tables.

First, although network information does not significantly affect the overall frequency of giving, it does have a modest effect on changes in frequency over time. When subjects have full information about the network, their proportion of giving increases from .86 in the first quarter to .91 in the last quarter ( $F[3,132] = 3.11; P < .05$ ); with restricted information, giving does not change over time. As a result, the frequency of giving is higher in the last quarter of the exchange period under full information than under restricted information ( $F[1,44] = 4.07; P < .05$ ).

Second, network information interacts with network size in its effects on trust ( $F[1,44] = 4.71; P < .05$ ). With full information, the effect of network size predicted for generalized exchange (greater trust in three-actor than in four-actor chains) is supported; with restricted information, network size does not affect trust. This effect is only partially explained by the somewhat higher frequency of giving under full information; when frequency is controlled, the effect is still borderline significant ( $P = .08$ ). In chain-generalized networks, knowledge of the length of the chain may also affect attribution of the benefactor's behavior to internal or external causes. In the longer four-actor chains, in which the benefactor's giving is dependent on the behavior of not one but two intervening actors, attribution of the benefactor's giving to his or her trustworthiness may be less likely.

Network information has no effect on other indicators of solidarity, nor does it affect the salience of conflict, which is low in all conditions. Overall, then, the effects of generalized exchange on solidarity are remarkably

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TABLE 7  
 GENERALIZED EXCHANGE CONDITIONS ONLY: UNADJUSTED MEANS AND SDs OF  
 EXCHANGE OUTCOMES, BY NETWORK INFORMATION AND NETWORK SIZE ( $N = 48$ )

Subjects' Evaluations	FULL INFORMATION		RESTRICTED INFORMATION	
	Three Actor	Four Actor	Three Actor	Four Actor
Social solidarity:				
Trust .....	5.60 (.99)	4.70 (1.06)	4.67 (1.01)	5.03 (1.19)
Affective regard .....	5.88 (1.02)	5.02 (1.24)	5.24 (1.12)	5.16 (1.31)
Social unity .....	5.67 (1.40)	4.78 (1.19)	5.07 (1.36)	4.72 (1.39)
Commitment .....	5.40 (1.22)	4.74 (1.09)	4.88 (1.06)	4.50 (1.23)
Salience of conflict .....	2.18 (1.11)	3.03 (1.19)	2.89 (1.41)	2.98 (1.69)
Exchange frequency <sup>a</sup> ...	.92 (.12)	.86 (.14)	.81 (.20)	.79 (.19)

NOTE.—SDs in parentheses.

<sup>a</sup> Frequency of transactions/giving, divided by opportunities for transactions/giving.

unaffected by actors' information of the chain-generalized network in which they are embedded.

*Making giving costly to self.*—A fifth generalized exchange condition, conducted as a follow-up to our larger experiment, offered subjects a choice between giving points to their recipient or giving two points to themselves. The first two columns of table 8 compare the means for this condition with the comparable condition in the larger experiment without cost (three-actor generalized exchange with restricted information). As expected, making giving costly to self reduces the mean frequency of giving to other by half, and reduces the means of all dependent variables accordingly. Consequently, when the two conditions are compared (the third column of table 8), the means for the condition with cost are significantly lower for all dependent variables. However, when the frequency of giving is controlled, the differences disappear: the adjusted means for the two conditions on the dependent variables (shown in the fourth and fifth columns of table 8) are very similar, and none of the differences are statistically significant (the sixth column of table 8). In short, differences in social solidarity between the two conditions are produced solely by their different frequencies of giving.

TABLE 8  
 COMPARISONS OF GENERALIZED EXCHANGE WITH AND WITHOUT COST TO SELF OF  
 GIVING TO OTHER, THREE-ACTOR NETWORKS WITH RESTRICTED INFORMATION ( $N = 24$ )

Subjects' Evaluations	WITHOUT FREQUENCY CONTROLLED, UNADJUSTED MEANS			WITH FREQUENCY CONTROLLED, ADJUSTED MEANS		
	No Cost	Cost	ANOVA <i>F</i> -Ratios	No Cost	Cost	ANCOVA <i>F</i> -Ratios
Social solidarity:						
Trust .....	4.67	3.47	12.57**	4.16	3.97	.18
Affective regard .....	5.24	3.98	13.17***	4.61	4.61	.00
Social unity .....	4.98	3.04	18.99***	3.98	4.04	.02
Commitment .....	4.88	3.56	12.87**	4.32	4.11	.18
Salience of conflict .....	2.89	4.61	14.63***	3.68	3.82	.06
Frequency of giving <sup>a</sup> ...	.81	.41	31.20***			

<sup>a</sup> Proportion of exchange opportunities on which subject gave to potential recipient.  
 \*  $P < .05$ .  
 \*\*  $P < .01$ .  
 \*\*\*  $P < .001$ .

DISCUSSION

Our results provide strong support for the logic of reciprocity theory and its extension to generalized exchange. The theory identifies two dimensions of the structure of reciprocity—indirect versus direct reciprocity, and unilateral versus bilateral flow of benefits—that vary across different forms of exchange and that affect the emergence of solidarity through three causal mechanisms. Based on their configurations on these two dimensions of reciprocity, we predicted that solidarity would be arrayed across the three forms of exchange in the following order: generalized indirect exchange > reciprocal direct exchange > negotiated direct exchange.

On every dimension of solidarity that we tested, the indirect reciprocity of chain-generalized exchange produced stronger solidarity than the direct reciprocity of negotiated or reciprocal exchange: stronger trust, greater affective regard, perception of greater social unity, and stronger feelings of commitment. These patterns apply both to feelings of trust and regard for specific exchange partners, and to feelings of solidarity and commitment to the social unit, that is, the dyadic relationship or the generalized network. They are also remarkably robust, holding across networks of varying size, varying levels of network information, and both with and without controls for variations in the frequency of exchange.

The differences between the two forms of direct exchange are smaller, as expected, but still clearly support the predicted ordering: on most dimensions of solidarity, reciprocal exchange produces more positive effects than negotiated exchange. The equal-power networks in this study re-



duced the sizeable differences found between reciprocal and negotiated exchange in previous studies of unequal-power relations (Molm et al. 2000, 2003, 2006). Nevertheless, reciprocal exchange produced stronger feelings of affective regard, social unity, and commitment than negotiated exchanges, controlling for differences in exchange frequency. The one exception to this pattern was trust. Trust develops when, in risky situations, exchange partners demonstrate their trustworthiness to each other; equal power reduces both the riskiness of reciprocal exchange and the behavioral commitments to particular partners that indicate trustworthiness. Consequently, under equal power, actors engaged in reciprocal exchange develop stronger bonds of affect, unity, and commitment than actors who negotiate agreements, but they do not trust each other more.

Other findings provide further support for the predicted ordering of the three forms of exchange and for the underlying mechanisms of reciprocity theory. Actors' perceptions of their relationship to the other participants become increasingly more "group-like" as we move from negotiated to reciprocal to generalized exchange, and the salience of conflict in these relations decreases. That actors engaged in generalized exchange were more likely to perceive themselves as a collective entity—"a group, a team"—and to describe that entity as united and committed is particularly remarkable given their restricted information about the network: even when participants were unaware that they were connected in a closed chain, in which each actor was dependent on the giving of other actors in the chain to maintain the system of generalized exchange, they developed strong feelings of solidarity and strong perceptions that they were engaged in a collective enterprise. These are effects of the *structure* of indirect reciprocity, produced by the experience of giving to one person and receiving from another person, not by knowledge of the larger network in which all of those individuals are linked. Repeated interactions with this structure of reciprocity produce greater solidarity than interactions in which two actors trade benefits with each other.

Our focus in this study was on *subjective* dimensions of solidarity — feelings of trust, affective regard, social unity, and commitment. Social solidarity can also be reflected in behavior, however, and examining the relationships among the form of exchange, feelings of solidarity, and exchange behaviors is particularly revealing. Because the high structural risk of indirect reciprocity makes it harder to establish stable systems of generalized exchange, the generalized exchange networks showed much greater variability in the frequency of exchange, as expected. In contrast to the direct exchange networks, the generalized networks tended to produce either highly stable systems in which all actors continuously gave to their recipients, or highly variable patterns of interaction with much lower frequencies of giving. What is striking is that *despite* its higher

variability and overall lower frequency of exchange, and even *without* statistically controlling for these behavioral differences, generalized exchange still produces stronger feelings of solidarity and perceptions of collectivity than direct forms of exchange. As long as networks sustained generalized exchange 70%–90% of the time—significantly less than the mean frequency of exchange in either of the direct exchange conditions—they produced mean values of trust, regard, unity, and commitment that were positive (greater than the neutral point of 4.0) and that exceeded the mean values in the negotiated and reciprocal conditions. Thus, if one behavioral indicator of solidarity is the willingness to forgive the occasional digressions of exchange partners (Lawler 2001; Ring 1996), then the participants in these generalized exchange networks appear to display it.

Our experiment was designed to test and extend a theory of the structure of reciprocity in exchange, but its findings also speak to other theories that have predicted relations between generalized and direct forms of exchange. First, our findings show that Lévi-Strauss's (1969) prediction of greater solidarity in generalized exchange holds even when tested under conditions that abstract the structure of direct or indirect reciprocity from the rich context in which Lévi-Strauss originally established his thesis. While many features of natural settings—differences in resources, norms, history—likely contribute to differences between generalized and restricted forms of exchange in those settings, our experiment shows that the structure of reciprocity itself, *independent* of these other features, can produce differences in feelings of solidarity. In addition, while the norms and values emphasized by the collectivist tradition that Lévi-Strauss represented may well contribute to the development of solidarity, our findings suggest they are not *necessary* for its establishment. In the absence of any norms, common values, or prior history, participants in our experiment not only established stable patterns of generalized exchange, but developed strong feelings of regard and solidarity for one another. These feelings developed out of the behavioral exchange, enacted within particular structures of reciprocity, in which our participants engaged.

Second, Lawler's (2001) prediction that social solidarity will be arrayed in the *opposite* order across the three forms of exchange is not supported by our findings. This prediction, derived from Lawler's affect theory of exchange, argues that *jointness of task* produces a sense of *shared responsibility* that leads actors to *attribute positive emotions from task success* to their social unit (the relation or group), thus *increasing actors' affective attachment* to the social unit. Because jointness of task is greatest in negotiated exchange and least in generalized exchange, Lawler predicts that solidarity will be arrayed in the same order. Our study is by no means a rigorous test of affect theory; we did not measure emotions, per se, nor

attributions of emotions, nor did we directly measure sense of shared responsibility. In addition, affect theory addresses structural dimensions of networks (types of connections) other than the ones we examined. Nevertheless, the conditions established in our experiment provide a reasonable test of the theory's predictions for form of exchange.

First, the three forms of exchange that we created in our experimental setting clearly vary on jointness of task—the degree to which individual contributions to task outcomes are inseparable—in the order that Lawler specifies. Yet actors in our negotiated setting, who jointly negotiated bilateral agreements, had the highest salience of conflict of the three forms of exchange and were the most likely to view their relationship as that of competitors or individuals working alone. These findings do not directly tap a sense of shared responsibility, but they seem inconsistent with it. Second, under the equal-power conditions of our experiment, the success of the negotiated exchanges was very high; nearly all possible agreements were made and those agreements were equal. It is in such equal-power relations and networks that Lawler and Yoon (1993, 1996, 1998) have previously found support for the notion that successful negotiated exchanges produce positive emotions. Thus, it seems likely that participants in our negotiated exchanges did experience the mild emotions of pleasure and satisfaction that Lawler and colleagues have found in other studies. Third, Lawler (2001) has suggested that the stronger feelings of trust, regard, and commitment produced by reciprocal than negotiated exchange in previous research (Molm et al. 2000) occurred because the target of evaluation was the other person rather than the social unit; our results show, however, that even stronger differences are obtained when the social unit is the target.

Our findings also help to clarify the importance of power in both theories. While neither theory restricts its scope to equal or unequal power, the body of empirical work now established shows quite clearly that the endogenous emotional process that relational cohesion theory and affect theory both assume is most likely to occur—at least for negotiated exchange—when exchange partners are equal rather than unequal in power (Lawler and Yoon 1993, 1996, 1998). Similarly, the differences between negotiated and reciprocal exchange that Molm and associates have found have been obtained in relations of unequal power (Molm et al. 2000, 2001, 2003, 2006); in the equal-power relations compared in this research, the differences between negotiated and reciprocal exchange were substantially reduced. In short, the affective/emotional processes of affect theory are most likely to occur in equal-power relations, while the risk-based/conflict processes of reciprocity theory are strongest in unequal-power relations.

Finally, our research makes a strong case for devoting greater attention to the study of generalized forms of exchange. Perhaps because of its

association with the primitive tribes that have been the subject of both classical and contemporary analyses (Bearman 1997; Lévi-Strauss 1969; Malinowski 1922; Ziegler 1990), generalized exchange has received far less attention from contemporary theorists than direct forms of exchange. But not only is generalized exchange highly pertinent to contemporary concerns with the development of trust and solidarity in social life, it is pervasive, in one form or another, throughout society. Examples range from neighborhood watch associations to open-source software to peer review of journal articles to informal networks of business associates. Our research suggests that such generalized exchange systems may play an important role in creating strong bonds in groups and networks, and shows the importance of the structure of reciprocity, per se—of unilateral acts of giving, reciprocated indirectly through links to multiple others—for producing those bonds.

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