

Social Exchange Networks: A Review of Experimental Studies

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Abstract

This article surveys laboratory experiments on social exchange networks. The method of laboratory experiments is prominent in this field. The various theoretical perspectives informing the experiments are grouped into three approaches: the first, dominated by network-exchange theory, is mainly concerned with power and structure, the second discusses social-psychological approaches and emphasizes behavioral and psychological dimensions such as reciprocity, emotions and cohesion, and the third is concerned with game-theoretic experiments embedded in network structures.

Keywords: *social exchange; network; laboratory experiment*

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Notes

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1. Introduction

Social exchange theory focuses on the distributive and allocative effects of human interactions within boundaries determined by the structure of the network. It is closely linked to social network analysis, which studies relational and structural aspects of networks. By providing theoretical explanations for behavioral patterns in network settings, social exchange theory complements and extends the scope of classical social network analysis. Over the past 40 years, theoretical and experimental studies have shed light on the variety of factors, which influence exchange in networks. Structurally induced power differences, emotions, commitment, trust, fairness preferences, status, coalition formation and the sequence of exchange are only a few of the factors that have been

considered. The experimental evidence presented in this article underlines the potential benefit of considering the social and behavioral preferences of agents in a network. Furthermore, social exchange research provides insights with respect to explaining why networks observed in the real world assume specific forms, why some links are used more often than others and some are dropped entirely, and how networks can be influenced through institutions in order to manipulate the flow of resources, specifically knowledge and information. The diversity of theories having been developed and tested experimentally thus complements classical social network analysis.

We organize the literature along three broad categories: 1) *Network Exchange Theory* and its variants, 2) theories with affinity to social psychology, and 3) theories using a game theoretic approach. The first

category of theories and experiments focuses mainly on structure and power in networks. Their research interests and the concepts they use are relatively close to classical social network analysis. The second category is concerned with emotions, cohesion, and other dynamics within networks, thus shifting the main focus away from the global structure of the network to the level of the individual. The studies summarized in the third category use game-theoretic concepts to study social exchange in networks. They focus on strategic choices and network formation and put again more emphasis on the structure of the network. This categorization is neither chronological nor exact. On the one hand, some of the more social-psychological approaches are also advancements of Network Exchange Theory. On the other hand, over the decades, some scholars carried out their research in different directions.

The empirical evidence presented in this article has been gathered exclusively in laboratory experiments. Social exchange research is thus among the pioneers in sociology in using this method for whole research programs. Laboratory experiments are well suited to examine social exchange network as they allow for highly controlled circumstances and exact comparison.

In the following, we first introduce the basic concepts, the standard experimental setting and the historical development of social exchange theory in section 2. Section 3 to 5 summarize the existing empirical work divided into the three aforementioned categories and section 6 concludes.

2. Basic Concepts

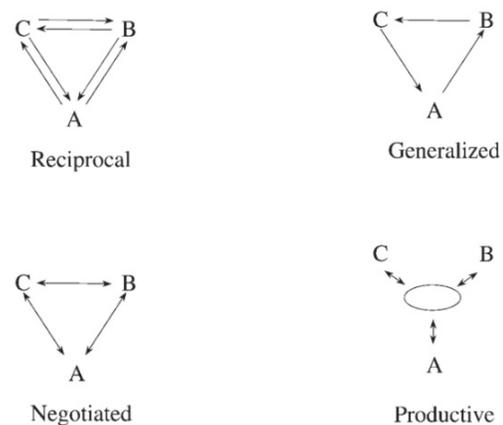
Social exchange takes place between two or more agents, each controlling resources which others value and seek to obtain.¹ Agents provide each other with the valued resources through some form of exchange and exchange is recurring over time. Resources can range from tangible goods to intangible goods such as status or approval. Most variants of exchange theory assume homogenous and self-interested agents who seek to maximize their utility within the constraints of the network structure (Molm, 2007). Some of these basic assumptions have been relaxed in more recent studies, for example by allowing for heterogeneity in the values of edges or in agents' characteristics.

2.1 Forms of Exchange

Exchange in networks can either take the form of

direct, *indirect*, or *productive exchange*. Direct forms of exchange are further differentiated into *negotiated* and *reciprocal* exchange. In negotiated exchange, agents jointly agree on the terms of exchange and these agreements are strictly binding. In reciprocal exchange, agents initiate exchange unilaterally and independently “without knowing whether, when, or to what extent the other will reciprocate” (Molm, 2003a, p. 35). From a game theoretic point of view, negotiated exchanges in which agents decide jointly, are cooperative games (see also Bienenstock & Bonacich, 1992), while reciprocal exchanges in which agents decide individually are non-cooperative games. Both negotiated and reciprocal exchange can be found in a variety of different settings such as negotiating division of task in a team or doing favors unilaterally (Molm, 2003a, 2003b, 2007; Molm, Takahashi, & Peterson, 2000). In *indirect exchange*, which is also referred to as generalized exchange, three or more agents exchange by giving benefits to one agent and receiving benefits from another, but not the same agent (for example, feedback chain in a department). An agent's outcome thus depends *indirectly* on another agent's behavior, while in direct exchange an agent's outcome depends *directly* on another agent's behavior. In *productive exchange*, a form that has been largely neglected in the literature (Lawler, Thye, & Yoon, 2000, p. 617), all agents have to contribute their share in order to obtain benefits (for example, coauthoring a book). Defection of one group member thwarts the exchange, characterizing productive exchange as a coordination problem. Productive exchange can comprise elements of negotiation and reciprocity (see Fig. 1).

Figure 1: Forms of exchange (Lawler, Thye, and Yoon, 2008, p.525)



¹ The terms agent, actor, and subject are used interchangeably in the literature.

Just as in social network analysis, exchange theorists usually assume dyadic exchange relations to be embedded in a broader *exchange network*. Exchange networks are defined as a set of at least three agents. Each agent is connected to at least one other agent in the network, a precondition for engaging in exchange. The dynamics of exchange depend crucially on whether network *connections* are positive or negative, a distinction proposed by Emerson (1972a, 1972b), which is also used in network analysis. In *positively* connected (or inclusionary) networks, exchange in one relation is independent from exchange in another relation. This means that agents are allowed to exchange with more than one of their connections per round. In *negatively* connected (or exclusionary) networks, exchange in one relation is contingent on *non-exchange* in another relation, that is agents can only exchange with one of their connections per round (Cook & Emerson, 1978; Molm, 2001). While most theoretical models in this field provide outcome predictions for negatively connected networks, only few models are designed to predict outcomes in positively connected networks as well. Following the theoretical focus, most experimental studies deal with negatively connected exchange networks.

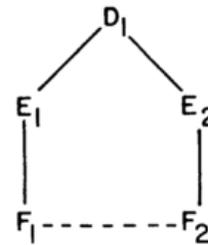
2.2 Experimental Setting

The formalization of social exchange theory in networks allows testing its propositions in controlled settings such as laboratory experiments. The experimental design developed by Cook, Emerson, Gillmore, and Yamagishi (1983) became the standard setup of many subsequent experiments on negotiated exchanges in negatively connected exchange networks. At the beginning of the experiment, agents are randomly assigned to a position in the network which they keep throughout the experiment. During the experiment agents may negotiate on how to divide a fixed amount of resources. Agents send offers and counter-offers until either an agreement or a time limit is reached. If two agents fail to agree, both agents gain nothing. The information available to the agents varies across studies. They may or may not be informed about the profit of others, the form of the network, or their position in the network. Cook et al. (1983), for example, use a restricted-information setting in order to limit the effects of agents' equity preferences on bargaining outcomes in a five-node network (see Figure 2). Many subsequent experiments relax this information restriction and instead use a full-information setting, that is, agents are informed about the constant sum to be divided, the shape of the network, and their position in the network.

Once the focus shifted away from explaining

behavior and the outcome of exchange solely in terms of network structure, not only the theoretical models but also the experimental settings became more diverse and sophisticated. For example, “[t]he rules about the form of exchange, who can exchange with whom, for how long, whether individuals can choose their partners or not, [...] and other aspects of the exchange interaction” (Cook, Cheshire, Rice, & Nakagawa, 2013, p. 80) were varied.

Figure 2: 5-node network with restricted information (Cook et al., 1983, p. 280)



2.3 Historical Development

George Homans (1961) was among the first sociological theorists who focused on interpersonal exchange, emphasizing individual behavior. He described behavior as a function of payoffs obtained from other humans or non-human agents. In the tradition of behaviorism, he incorporated the principle of reinforcement according to which A's behavior is reinforced by B's behavior and B's behavior is in turn reinforced by A's behavior. Homan's main interest was social behavior that emerges over time from this social process of mutual reinforcement. He framed his ideas in terms of rewards and punishment and discussed the conditions of exchange behavior. Homan's focus on the individual in the explanation of processes in social groups was criticized as reductionist by Peter M. Blau (1964) because of the use of psychological principles to explain social behavior (Cook et al., 2013, p. 62). Instead, Blau proposed a more economic and utilitarian view on behavior. In the utilitarian tradition, he assumed agents to be forward-looking and acting in anticipation of future rewards, as opposed to the more backward-looking agent assumed by Homan's reinforcement principle. Blau focused mainly on reciprocal exchange of extrinsic benefits and the thereby created social structure (Cook et al., 2013). His work on the structure of social exchange and emerging social processes in groups influenced Richard M. Emerson's *Power-Dependence Theory* (1972a; 1972b), which combines the work of Homans and Blau. He moved the focus from the individual agent in a dyadic exchange relation to larger networks and shifted the emphasis to the relations between agents and the *structure* of the exchange network. He defined an exchange network as a set of directly connected exchange

relations mutually influencing each other. From then on, research on social exchange generally moved to a more formal and analytical approach (Cook et al., 2013; Molm, 2007).

3. Structure, Power and the Form of Exchange

Early social exchange theories assume that the static structure of a network determines individual bargaining power. These exchange theories can be divided into three branches. The first branch originates in Emerson's *Power-Dependence Theory* and has mostly been pushed forward by a group of researchers around Karen Cook. The second branch is *Network Exchange Theory (NET)*, associated with David Willer, Barry Markovsky, and others. The third branch is the extensive research program of the group around Linda Molm, which analyses different forms of exchange.

3.1 Network Structure and Power

The first branch of early social exchange theories was initiated by Cook and Emerson in the 1970s and 1980s. Cook et al. (1983) and Cook and Yamagishi (1992) expand the scope of the *Power-Dependence Theory* of Emerson (1972a, 1972b) to develop the so-called *Equi-Dependence Theory*. This theory assumes that structural power is a function of mutual dependence of agents in negatively connected networks. The maximum amount of resources an agent can gain in an exchange depends crucially on the best alternatives of her exchange partner. If an agent attempts to obtain more than this maximum, the partner will choose her best alternative instead. At the point where agents A and B are equally dependent on each other, the relation is said to be *equi-dependent*. The exchange ratio at this equilibrium is not necessarily an equal split of resources. Instead, it reflects the relative structural power of the exchange partners. Agents can thus have weak power or strong power. In a laboratory experiment, Yamagishi and Cook (1993) find that strong-power agents gain more in exchange than weak-power agents as predicted by *Equi-Dependence Theory*.

A different approach is chosen by Cook and Emerson (1978), who manipulate power by varying the *value* of exchange relations in an experimental study. In a power-balanced network, all agents dispose of the same number of equally valuable exchange relations and all agents are expected to benefit equally from exchange. In a power-unbalanced network, exchanges with the central agent are of more value than exchanges with the peripheral agents. That is, despite of having the same number of exchange alternatives available,

the peripheral agents are less powerful than the central agent and are expected to benefit less from exchange. The experimental results support these hypotheses: While outcome differences between the central and the peripheral agents converge towards a very low level in balanced networks, they continue to exist in unbalanced ones. Cook and Gillmore (1984) also use differences in value to manipulate power in exchange networks. The authors assign different values to the exchange relations in a three-agent exchange network to study whether two weak agents choose to form a *coalition* against the stronger agent when given the opportunity to do so. The experimental results show that power imbalances indeed lead to the formation of "weak-against-strong" coalitions and an almost equal distribution of profits between the powerful agent and the coalition of weak-power agents. Furthermore, coalitions are more likely to form the more severe the imbalance of power in the network is. Besides these two studies, value has not been used to manipulate power in exchange networks until the late 1990s, when value has been rediscovered as a research topic in the context of social exchange theory (see Section 4).

3.2 Network Exchange Theory

Another branch of early social exchange theories is the so-called *Network Exchange Theory (NET)* which was developed on the basis of Elementary Theory (Willer & Anderson, 1981) as a critique of *Power-Dependence Theory* (Markovsky, Willer, & Patton, 1988). In order to assess the relative power of positions in a network, the authors develop the so-called graph-theoretic power index (GPI) which is related to structural concepts from social network analysis. Markovsky, Skvoretz, Willer, and Lovaglia (1993) further refine *NET* by introducing the concept of exclusion: an individual in a weak position is more likely to be excluded from exchange than an individual in a strong position. They introduce the path-breaking distinction between *weak* and *strong-power* networks. In weak-power networks, power and thus individual profits are distributed more evenly, compared to strong-power networks, where the structure of the network enables individuals in powerful positions to acquire more profit than others.

These predictions are tested by Skvoretz and Willer

(1993), who have been first to experimentally compare predictions of a set of different exchange theories, to which they added their own *Exchange-Resistance Theory*.² This theory is close to NET in its assumptions, but includes the concept of resistance. An agent is considered less likely to *resist* the terms of an agreement if she faces a high probability to be excluded from exchange. When both agents are equally resistant to their offers, the point of *equi-resistance* is reached. They identify *Exchange-Resistance Theory* as the best model explaining the observed outcomes.

Lovaglia, Skvoretz, Willer, and Markovsky (1995) further develop *NET* by combining the concept of resistance with the degree of the agent, another concept stemming from network analysis. The degree of an agent is the number of direct relations this agent has to other agents in the network. The resulting *GPI-RD* model assumes that a higher relative degree of an agent leads to a higher outcome. Further, a higher degree is assumed to bias the effect of inclusion in an exchange network: a structurally advantaged agent may gain more from a single exchange, but may exchange not as often as agents with a lower relative degree since others expect higher-degree agents to be tougher in bargaining. The authors test the same theories as Skvoretz and Willer (1993) and add the *Exchange-Resistance* model and the newly developed *GPI-RD* model, as well as a the *GPI-R* model, which is basically the same as the former, but without degree. They find that the *GPI-RD* model offers the most exact predictions.

Another model to be mentioned in this context is the *Power Model* of Yamaguchi (1996), which is applicable to positively and negatively connected networks. Yamaguchi assumes power to be the result of an agent's network position (structural causes) and the exchanges with her network partners (relational causes). The power of an agent is affected by the utility maximizing behavior of her partners. As long as a network has not reached an equilibrium stage, agents will seek alternative partners for exchange, leading to an increase in the power of those partners facing a rising demand for their resources. Using the experimental data of other studies, Yamaguchi finds experimental support for his model's predictions

and claims that his model performs at least as well as *Expected Value Theory* and *Exchange-Resistance Theory*. However, the model was subject to sharp methodological criticism by Markovsky, Willer, Simpson, and Lovaglia (1997), and was not further developed.

In a comparative study, Willer and Emanuelson (2008) test ten social exchange theories that have been developed until that point. They identify the *GPI-R* model (Lovaglia et al., 1995) as the best performing theory and the *Equi-Dependence Theory* (Cook & Yamagishi, 1992) ranks ninth.³ The authors also call for the extension of all existing theories to larger networks and contribute a paper on large scale exchange networks (Willer, Van Assen, & Emanuelson, 2012), in which the authors offer *Domain Analysis* (DA) as a tool to cut large networks into smaller, calculable networks.⁴ *DA* distinguishes between domains (subnetworks which function inside and outside the large network in the same way), components (subnetworks function in the large network and outside of it in different ways) and breaks (connections which are never used) -- concepts, which are also used in network analysis. Experimental data and a simulation support their proposition of domains, components and breaks in social exchange networks. They show that power decreases as network density increases. Density is a measure for the number of connections in a network, a concept developed by social network analysts. Although *DA* only seems to work in networks with low density it nevertheless widens the scope of social exchange theories.

The theories presented so far share the assumption that all exchanges in a network happen simultaneously. In contrast, *Sequential Power-Dependence Theory*, developed by Buskens and Van De Rijt (2008), considers the sequential nature inherent to exchange. As soon as two agents have decided to exchange, the opportunity structure for the remaining agents in the network changes and this, in turn, may change their bargaining power. The anticipation of a potential loss of power should cause profit splits to be more equal than usually predicted in such a network. Buskens and Van De Rijt (2008) develop a measure to predict unique profit splits for every dyadic relation in every possible network type under consideration of a changing opportunity structure.

2 Skvoretz and Willer (1993) evaluate the predictions of their Exchange-Resistance Theory as well as those of three other theories: Core Theory (Bienenstock & Bonacich, 1992), Equi-Dependence Theory (Cook & Yamagishi, 1992), and Expected Value Theory (Friedkin, 1992).

3 Tested theories: Power-Dependence Theory (Cook & Yamagishi, 1992), the GPI-R Model (Lovaglia et al., 1995), X-Net (Markovsky, 1995), Quantified Core (Bienenstock & Bonacich, 1992; Skvoretz & Fararo, 1992), Expected Value Theory (Friedkin, 1992), Rational Exchange Theory (Skvoretz & Fararo, 1992), Power Model (Yamaguchi, 1996), Identity Theory (Burke, 1997), Network Control Bargaining Model (Braun & Gautschi, 2006), and the Expected Value-Resistance Model (Willer & Emanuelson, 2008).

4 The application of exchange theories is often limited by the size of a network. The maximum possible is at most 12 agents. Theories can be applied to small networks in a lab experiment, but not to larger networks in the field. The network size is limited because of computational complexity or the limits programs for application have (Willer et al., 2012, p. 171).

The authors refer to the data generated by Willer and Emanuelson (2008) to assess the predictive power of two variations of the *Sequential Power-Dependence Theory* in comparison to three other theories.⁵ Both models outperform the predictions of *Equi-Dependence Theory* and *Expected Value Theory*. However, the *GPI-R* model still performs better and thus the conclusion of Willer and Emanuelson (2008) is supported.

3.3 The Form of Exchange and Power

Following the lead of the seminal experiment of Cook et al. (1983), the vast majority of theoretical and experimental studies discussed so far assumes implicitly or explicitly that exchanges are *negotiated*. However, the limitation to one form of exchange and the neglect of other forms may have led to assumptions and principles valid only for negotiated exchange and not for exchange in general since “the form of exchange affects the causal mechanisms underlying power use and the relation between network structure and power” (Molm, 2003b, p. 1). To overcome this limitation, Molm and colleagues started a series of experiments in the late 1990s to study how the *form of exchange* affects power, inequality, trust and commitment as well as the perception of fairness in exchange relations. Besides the form of exchange, Molm (1997) further distinguishes between power of coercion (that is, power based on the capacity to punish) and power of reward (that is, dependence on others for rewards).

Molm’s *Theory of Coercion in Exchange* builds on Emerson’s *Power-Dependence*.⁶ Coercion is not induced by the structure of a network but has to be used strategically by the agents (Molm, 1997). Molm, Peterson, and Takahashi (1999) find experimental evidence that average power use is lower in reciprocal exchanges than in negotiated exchange. Powerful agents gain more from exchanging with more dependent agents in negotiated exchange, while they gain more from exchanging with less dependent agents in reciprocal exchange. In negotiated exchange, powerful agents seem to prefer the less risky strategy of exchanging continuously with a partner who is more dependent rather than choosing a more valuable but riskier strategy of exchanging primarily with the less dependent partner.

In the 2000s, Molm and colleagues set out to develop a more general theory of power in exchange networks. In a first step, Molm, Peterson, and Takahashi

(2001) consider variations in the relative *value* of a resource as a further dimension, as did Cook and Gillmore (1984; see above). They argue that an agent A’s dependence on B increases the more value A can obtain from B, relative to the value A can obtain from alternative exchange relations. Access to more valuable alternatives decreases A’s dependence and increases A’s power over B. Consequently, A’s power use over B is expected to increase with the availability of more valuable alternatives, resulting in higher payoffs for A. In an experimental study, Molm et al. (2001) found that in negatively connected networks A’s power over B not only increases with the value of A’s alternatives to B, but that a higher value even tends to compensate for lower availability. Building on these results and results obtained in other experiments, Molm (2010) develops the *Theory of Reciprocity*. This theory will be described in the following chapter since it marks the beginning of a stronger social-psychological orientation of Molm’s research agenda.

Early social exchange theories have been mainly concerned with the structural properties of a network and its consequences for the action space of its agents. The pioneering social exchange researchers focus not only on similar topics as social network analysts, that is, structure and power, but also use similar concepts to describe networks and relations. As social exchange theory evolves, the connection to network analysis decreases and the focus of social exchange research shifts gradually towards the individual agent in the network.

4. Social-psychological Approaches

From the turn of the century onwards, social-psychological factors and their influence on behavior in social exchange networks have attracted more attention. In contrast to purely network analytical approaches, these theories explain behavior in exchange networks and outcomes of exchange on the basis of preferences and emotions. In this section we will present the research program which led to the development of the *Theory of Reciprocity* as well as other social-psychological theories of exchange. Social-psychological approaches consider exchange relationships to exceed the exchange of material goods between rational profit-maximizing agents. Agents are perceived as social agents who can feel emotions (e.g. Lawler, 2001; Molm, Peterson, & Takahashi, 2003),

5 GPI-R model (Lovaglia et al., 1995), Equi-Dependence Theory (Cook & Yamagishi, 1992), and Expected Value Theory (Friedkin, 1992).

6 Molm (1997) maps the development of her Theory of Coercion in Exchange and thereby gives an excellent example of the development of theory in a theoretical research program using laboratory experiments (see Zelditch, 2014). See chapter 10 for a summary on the theory and chapter 11 on the results of the experiments.

commit to a relationship (e.g. Lawler, Thye, & Yoon, 2006; Molm, 2010), and experience cohesion within a relation or a network (e.g. Lawler & Yoon, 1998). In consequence, exchanges may be driven not only by economic rationality, but also by emotions or appreciation of a relation, thereby changing the interpretation of the dynamics observed in social exchange networks.

The role of emotions, commitment and cohesion in exchange situations have been studied for more than a decade largely in parallel by two research groups headed by Linda Molm and by Edward Lawler. Only recently, attempts of connecting and reconciling their theories and experimental findings were made (Kuwabara, 2011; Lawler, Thye, & Yoon, 2008; Molm, Melamed, & Whitham, 2013). We will first present the work of the two research groups separately and then discuss links between their research programs. Finally, we will review additional work on fairness, status and value.

4.1 Reciprocal Exchange and Salience of Conflict

Molm (2010) develops the *Theory of Reciprocity* as part of an extended research program. In a first step, Molm et al. (2000) compare how *trust* and *commitment* develop in negotiated and reciprocal exchange networks. They find that trust and affective commitment (that is, positive emotions towards the exchange relation or group) are more likely to develop in reciprocal exchange relations than in negotiated exchanges. The emergence of emotions in reciprocal exchange networks depends on how the exchange partners behave. The greater the behavioral commitment (that is, recurring exchanges within the same relation) of the partner and the lower the inequality of profits, the higher the level of trust and affective commitment. These effects are not observed in negotiated exchanges. Confirming previous findings (Molm et al., 1999; see section 3) the experiment demonstrates once more that inequality of outcomes is greater in negotiated exchanges.

In another series of experiments, Molm et al. (2003) show that agents in negotiated exchanges hold their exchange partner more responsible for the outcomes of exchange even if the outcome is the same as in the reciprocal exchange situation. In addition, they are more likely to perceive their partner as being untrustworthy, unhelpful, competitive, and tough. In reciprocal exchanges, the rate of reciprocity matters, while the value of the given benefits makes no difference. In negotiated exchanges, the value of benefits determines

whether the exchange is perceived as fair, while the rate of exchange is irrelevant. Molm, Collett, and Schaefer (2006) suggest, and empirically show, that the greater *salience of conflict* in negotiated exchange is responsible for these differences in fairness perceptions between exchange types. In negotiated exchange, the agents are in direct confrontation with each other, i.e. the conflict is more salient, compared to unilateral giving in reciprocal exchange.

Emotions emerge not only with respect to the behavior of the other agents, but also towards the relation as such. Reciprocal exchange can provide *symbolic value* beyond the instrumental value of exchange. Symbolic value is created through constant reciprocal behavior of the other agent which triggers affection for an exchange relation (*expressive value*) and reduces uncertainty with respect to that relation. The authors show experimentally that agents primarily consider the expected instrumental value of exchange and less its symbolic value when choosing between two exchange relations of different instrumental and symbolic value. A potential explanation is that the instrumental value of an exchange relation is obvious right from the beginning, while the symbolic value of a relation becomes salient only after repeated exchange (Molm, Schaefer, & Collett, 2007).

Summarizing this research program, Molm (2010) suggests that the *Theory of Reciprocity* consists of three core elements: the risk of non-reciprocity, expressive value, and salience of conflict. These mechanisms jointly affect the development of integrative bonds of trust in an exchange relation, affective commitment, and relational cohesion.

4.2 Relational Cohesion and Jointness of Action

Independent of, but parallel to the group headed by Linda Molm, Edward J. Lawler and his colleagues also study emotions and cohesion and their interaction with structural factors. Over a period of two decades, they have developed *Relational Cohesion Theory*, the *Affect Theory of Social Exchange*, *Network-to-Group Formation Theory* and the *Choice Process Theory of Commitment*.

Lawler and Yoon connect *NET* (see Section 3) with *Relational Cohesion Theory*, a theory developed and tested in a series of experimental studies (Lawler & Yoon, 1993, 1996, 1998).⁷ The authors assume that the frequency of exchange affects an agent's relational cohesion and commitment to a relation. Two complementary processes are considered responsible

⁷ Initially, their focus is on the dyadic relation embedded in a minimal exchange network (i.e. agents have only one exchange alternative) or a small exchange network (e.g. kite or branch) and later they extend their theory to the entire network, i.e. multi-agent networks.

for the development of commitment in dyadic exchange relations. If exchange is repeated successfully between two agents, positive feelings emerge (emotional process) and the predictability of exchange with this partner increases (uncertainty reduction process). Consequently, agents perceive these relations as more cohesive and develop greater commitment to this exchange relation which results in a more favorable treatment of the exchange partner. Lawler and Yoon (1996) consider three forms of commitment behavior and compare them experimentally: (1) Agents stick to an exchange relation even if better alternatives exist (*staying behavior*), (2) unilateral and non-contingent *gift-giving* to the exchange partner in form of tokens, and (3) *contributing* to a group project when the profits from the project are divided equally among agents. The results support *Relational Cohesion Theory* by showing that the perception of relational cohesion stimulates all three forms of commitment. In later versions of the model, starting with Lawler et al. (2000), both the emotional process and the uncertainty reduction process are incorporated as complementary processes operating independently.

However, Lawler and Yoon (1998) notice differences in the level of relational cohesion and commitment between structurally induced equal-power relations and unequal-power relations. The relatively higher frequency of exchange in equal-power relations triggers stronger positive feelings and thus higher relational cohesion. These relations are also more likely to persist when agents are provided with a second and better exchange alternative after having exchanged with the same agents for some time. Lawler and Yoon interpret this staying behavior as a sign of commitment to the exchange relation.

In the same experimental study, Lawler and Yoon (1998) also test the effect of an overarching *group identity*, which is imposed *exogenously* on the network. They assume that relational cohesion and behavioral commitment in individual dyads are weakened by framing the whole exchange network as a group with a common identity. In this case agents are expected to keep exchanges balanced across all potential exchange partners. However, the experimental results show no evidence for a weakening of cohesion and commitment on the dyadic level in the group-treatment. Following up on this work, Lawler and colleagues (Lawler et al., 2000; Thye, Lawler, & Yoon, 2011) examine whether the endogenous processes underlying *Relational Cohesion Theory* (uncertainty reduction and emotional processes) may induce agents to develop a sense of cohesion not only on the level of the dyad but also on the level of the group or network in a productive exchange setting.

Comparing the results of the triadic productive exchange experiment (Lawler et al., 2000) with the results of the earlier experiment on the dyadic level (Lawler & Yoon, 1996), the authors find that multi-agent exchanges exacerbate the development of cohesion and commitment behavior. However, although fewer positive emotions are created, the perceived group cohesion reaches the same level in triads as in dyads.

Emphasizing the crucial role emotions play for the development of cohesion and commitment, Lawler (2001) develops the *Affect Theory of Social Exchange*. The author assumes that emotions triggered through participation in exchange can be attributed to the relevant social unit (relations, groups, networks). His basic proposition is that the greater the *jointness* (joint action) of the exchange task, the greater the agents' perception of *shared responsibility* and the more likely agents will attribute their emotions to the relevant social unit, which in turn leads to stronger commitment and cohesion. The perception of jointness and shared responsibility depends crucially on the form of exchange, as experimental results show (Lawler et al., 2008). Productive exchange triggers the strongest emotions since tasks are highly interdependent and the degree of shared responsibility is high. In negotiated exchanges the shared responsibility for an exchange task is also relatively high since agents have to agree on binding terms of exchange. However, there is potential for conflict if structural power is unequally distributed. In reciprocal exchanges, Lawler finds that emotions resulting from a successful exchange are weaker since agents do not carry out a joint task and the perception of shared responsibility is lower. In generalized exchange, reciprocity is indirect and agents are unlikely to develop a strong sense of shared responsibility. According to Lawler generalized exchange thus lacks an emotional foundation.

4.3 Connecting Salience of Conflict and Jointness of Action

At this point, the research agendas of the groups around Lawler and Molm start to converge. Both study emotions and relational cohesion, but while Molm locates the strongest emotions in reciprocal exchange, Lawler finds them in negotiated exchange. In a first attempt to explain their diverging findings, Lawler tentatively traces them back to the use of different concepts, namely *salience of conflict* and *jointness of task*. Depending on which concept is used and presented to the agents in the experimental questionnaire the findings may differ (Lawler et al., 2008, p. 539).

Kuwabara (2011) proposes to reconcile the divergent claims of Lawler and Molm by assuming that the

subjective context of exchange determines whether negotiated exchange strengthens (Lawler's position) or weakens (Molm's position) relational cohesion. If agents perceive the exchange task as cooperative (competitive) and their exchange partner as positive (negative), they will develop more (less) cohesion, trust, and affective regards towards this exchange relation. These predictions are tested in two experiments. In the first, unilateral reciprocal exchange (i.e. gift-giving) is compared with two types of negotiated exchange with different levels of conflict. In competitive negotiated exchange, the salience of conflict is high, while it is low in cooperative negotiated exchange. The results concerning cohesion are unambiguous: in competitive negotiated relations, cohesion is lowest, reciprocal exchange ranges in the middle and cooperative negotiated exchange yields the highest level of cohesion. These findings are in line with both Molm's and Lawler's position, as Kuwabara (2011, p. 577) finds both "the mediating effect of perceptions of cooperation (Molm, 2010) and the moderating effect of joint action (Lawler et al., 2008)."

In their most recent work, Molm et al. (2013) also intend to reconcile *Affect Theory of Social Exchange* and their own *Theory of Reciprocity* by 'embedding' one form of exchange in the other. The experimental study shows that embedded negotiated exchange relations generate higher commitment and lower inequality compared to pure negotiated exchange relations while embedded reciprocal exchange relations do not trigger such effect.

4.4 Cohesion and Structure

Even though Lawler and his collaborators focus their research mainly on emotions, commitment, and cohesion, they do not neglect the structural aspect of networks. Lawler et al. (2006) study the development of cohesion and commitment in structurally *enabled* and structurally *induced* relations. In a structurally enabled relation, agents mutually prefer to exchange with one another, while in a structurally induced relation they have other preferences but no alternative to exchanging with each other. The *Choice Process Theory of Commitment* (Lawler, 1992, 1997) suggests that agents are more likely to commit to exchange relations that give them a stronger sense of control, meaning that agents prefer enabled over induced exchange relations. In line with their expectations the authors find (1) stronger positive emotions, (2) greater perceived cohesion, (3) greater perceived relation value, and (4) greater commitment in structurally enabled than in structurally induced relations.

In a related experimental study Thye et al. (2011) study whether relational ties and the sense of shared experience

resulting from frequent exchange are strong enough to induce agents to perceive *competitive* exchange networks as a group (Lawler et al., 2000). They develop the *Network-to-Group Formation Theory*, combining the concept of relational cohesion with the concept of structural cohesion from early social exchange theory (Cook et al., 1983). This theory distinguishes between cognitive and behavioral group formation. The first requires agents to perceive the network as a group, and the second can be observed when agents share resources even if this countervails their self-interest. Thye et al. (2011) find evidence that networks with a higher level of structural cohesion induce more frequent exchanges and, consequently, higher levels of cognitive group affiliation. The experimental results also indicate higher levels of behavioral group affiliation for agents in strong-power positions, but not for agents in weak-power positions.

In another related study, Yoon, Thye, and Lawler (2013) compare cohesion, emotions and variance of profits explicitly between dyads and triads based on two distinctions introduced by Simmel (1964). First, triads create the conditions for the existence of a 'tertius gaudens', i.e. a third person who may profit from the competition between the other two agents. Second, triads necessarily require the exclusion of one agent for structural reasons if agents are connected negatively. Agents take exclusion in a dyad more personally than in triads, since no structural force makes exclusion necessary. The elementary core of Simmel's reasoning is that "triads reduce variability" in behavior and thus in profit (Yoon et al., 2013, p. 1458). The authors find evidence for three hypotheses derived from Simmel's reasoning: 1) Exchange frequency and variance in profit converge in triads rather than in dyads, 2) cohesion is higher in triads, and 3) these results are driven by the fact that emotions have a stronger effect in dyads and the uncertainty reduction process is more important for triads. These findings contradict earlier social exchange theories (see Section 3), which predict more cohesion in dyads than in triads due to the power of exclusion in triads and the lack of other options in a dyad. The question is how exclusion from exchange in the dyad and profits can be distributed (equally) within the triad in repeated exchange settings.

4.5 Emotions and the Perception of Justice

Various scholars study exchange in networks with a focus on justice and the perception of justice (Hegtvedt & Markovsky, 1995; Leventhal, Karuza, & Fry, 1980; Lind & Tyler, 1988; Tyler & Lind, 1992). Hegtvedt initially uses vignette-studies to address her research questions, but later turns to laboratory experimental methods.

How negotiations affect the perception of procedural and distributive justice, which in turn influence emotions and the distribution of outcomes, is examined in an experiment by Hegtvedt and Killian (1999). While procedural justice refers to the process of distribution, distributive justice refers to the resulting distribution of resources. The design of the experiment differs from previous designs. Participants divide points not only between themselves, but also a third party, who does not perform the same task as the other two agents. A positive correlation between procedural justice and distributive justice is found, but the types of justice trigger different emotional reactions. The perception of procedural fairness generates positive emotions, but is negatively affected by the emergence of conflict in negotiations. The perception of distributive fairness, on the other hand, is affected by the observed levels of profit and agents' performance levels. High performing agents perceive their own profit as more fair than low performing agents who perceive their lower income as less fair. Hegtvedt and Johnson (2000) conclude that individuals perceive different distributions as just and that an individual's view of justice can also be influenced by the groups' legitimization and endorsement of a distribution. Critically echoing the title of Molm et al. (2003), they claim that procedural and distributive justice "is not simply in the eyes of an individual beholder, but it is in the eyes of a community, however defined" (Hegtvedt 2005, p. 25).

Hegtvedt's work has only recently been recognized in the social exchange research community. Based on Hegtvedt's findings, Park and Melamed (2015) investigate the relation between reward and fairness perception in a productive exchange situation. They find a positive correlation between the stability of rewards and both the justice evaluation of the situation as well as the commitment of an agent to her group.

4.6 Status and Value

While Molm et al. (2001) treat value as a further dimension of network structure, Thye (2000) suggests that the value of a resource depends on the status characteristics of the negotiating agents. He develops the *Status Value Theory of Power*, suggesting that status value spreads from agents to resources if agents differ in their status characteristics (e.g. gender, race, education). Resources held (and sought) by high-status agents are perceived as more valuable than the same resources held (and sought) by low-status agents. As a consequence, exchanges with high-status agents are preferred and the *Status Value Theory of Power* predicts that positive status characteristics are accompanied by power advantages and higher profits in social exchange

relations (Thye, 2000). The authors find support for these predictions in a laboratory experiment where participants are led to believe that they are exchanging with a partner of higher, equal or lower status. These results hold true in both equal-power structures and weak-power structures, suggesting that a higher status may even compensate for the disadvantages of a weak-power position.

Status also alters the expectations regarding the performance of an agent. The *Status Influence Theory of Power* developed by Thye, Willer, and Markovsky (2006) builds on *Status Characteristics Theory* (Berger, Norman, Balkwell, & Smith, 1977; Wagner & Berger, 1993; SCT) and on NET, from which the concept of exclusion is borrowed. SCT suggests that people expect agents with a higher level of status characteristics to be more competent, perform better and obtain better outcomes when negotiating with agents of lower status. In line with these theories, the authors find that high-status agents are perceived as more competent and influential by low-status agents. Consequently, high-status agents obtain higher profits from exchange.

4.7 Identity

A different perspective is taken by the *Identity Model* of Burke (1997), which focuses on the identity of a typical agent participating in a network exchange experiment. Contrary to most other theories, Burke's model does not assume that agents seek to maximize their profits from exchange. Instead, agents aim at participating in as many exchanges as possible. They try to avoid getting low profits from exchange as well as taking a long time to match offers which increases the likelihood of being excluded from exchange. What the agents are trying to accomplish is defined by their identity standards, while what they are actually able to accomplish depends on the structure of the network. Participants are motivated by the desire to be included in exchange and weak positions will make higher offers in order to be included. Power therefore emerges over time. Agent-based computer simulations are used to predict power and profit splits in different exchange networks.

The socio-psychological approaches summarized in this section show that not only the structure of a network, but also the behavior of others and individual preferences influence an agent's behavior. Positive and negative emotions play a role in the choice of an exchange partner, just as the status of the partner, the value of the exchanged goods and the relation itself. By adding socio-psychological concepts to the analysis of social exchange, the interpretation and prediction of agents' behavior in a network has changed. The main focus shifted from

the structure of the network to the individual behavior of agents and the research interests of social exchange theory and social network analysis are less aligned.

5. Game-theoretic Approaches

We now turn to approaches applying game-theoretic principles, which are more common in economics, to social exchange networks. Bienenstock and Bonacich (1993, p. 117) comment, “[t]here is much overlap in what is studied in the social sciences. Different disciplines have different theoretical orientations and different approaches. Not infrequently, in two fields the same work may be under investigation with two distinct theoretical bases and two separate vocabularies.” From a game-theoretic perspective, exchange can pose coordination problems and social dilemmas comparable to games such as the Prisoner’s Dilemma, the Privileged Game, the Chicken Game (Borch & Willer, 2006, p. 78) or the Trust Game (e.g. Buskens, Raub, & van der Veer, 2010; Raub, Buskens, & Frey, 2013). The first attempts to analyze networks with game-theoretic methods took place in the early 1990s. From the mid-2000s onwards, a general movement of network exchange research towards game-theory can be observed.

5.1 The Pioneers

The pioneers of game-theoretic research on social exchange networks stress how structure affects power and the distribution of outcomes (Bienenstock & Bonacich, 1992; Friedkin, 1992). In addition, they take the value of exchange into consideration (Friedkin, 1995; Skvoretz & Fararo, 1992). Bienenstock and Bonacich (1992) describe exchanges in negatively connected networks as N-person cooperative games with transferrable utility. They use the game-theoretic concept of the ‘core’ to predict the distribution of outcomes and the stability of exchange relations in the network.⁸

The core is based on the assumptions of individual, coalition and group rationality. Individual rationality implies that an agent will not accept an exchange providing her with fewer resources than she could earn by not exchanging. Coalition rationality implies that two agents only exchange when the sum of profits they obtain from exchanging with each other equals at least the profit they could obtain from exchanging with other partners. Group rationality entails that the total profit of all agents in the network realized by exchange is as least as high as

the profit obtained in alternative exchanges (see Lovaglia et al., 1995). In networks with a core, the division of profits between agents satisfies individual, coalition and group rationality and is predicted to be stable. In networks without a core, agents are expected to have difficulties reaching an agreement and these networks are expected to be unstable. In a lab experiment Bienenstock and Bonacich (1993) show that their game-theoretic solution predicts relative power in exchange networks just as well as did *NET* and *Power-Dependence Theory* (see Section 3).

Friedkin (1995) uses the experimental data obtained by others (Bienenstock & Bonacich, 1992; Markovsky et al., 1993) to test the theoretical predictions of his own models. In the *Expected Value Theory* Friedkin (1992, 1993, 1995) takes into account not only the structure of the network, but also the value of the available exchange relations. He assumes that rational agents seize every exchange opportunity they have. Exchange outcomes are thus the result of the opportunity structure provided by the network and an agent’s bargaining activities. He further assumes that an agent’s exchange offer is a function of her dependence on her exchange partner. The expected value of an exchange for an agent A depends on the number of resources A expects to obtain from an exchange with B, weighted by the relative frequency of that specific exchange relation. The probability of an exchange depends on the value of the exchange in the previous period. This iterative process, in which the payoffs in one period affect the probability of exchange in the next period, is meant to explain why the most central agent not necessarily receives the largest payoff. The experimental results confirm the model’s expectation that the central agent has an initial advantage in exchange which diminishes after some rounds when an exchange equilibrium with small power differences is reached.

5.2 The Network Control Bargaining Model

More recently, Braun and Gautschi (2006) have developed the *Network Control Bargaining Model (NCB)* to predict outcomes in exchange networks. The model builds on the generalized Nash bargaining solution and combines it with a specific measure of individual network control. The authors assume that depending on the position in the bargaining network an agent exhibits different degrees of network control. Network control depends crucially on the number of A’s exchange partners and the number

⁸ Other game-theoretic solutions would be the Shapley Value and the Kernel. For a summary, see Bienenstock and Bonacich (1993, pp. 126-128)

of her partners' exchange alternatives. In a negatively connected network, an agent's relative bargaining power and exchange profit will rise with an increase in her network control (or a decrease in the other agent's network control). The relative bargaining power of the agents involved in exchange determines the distribution of exchange profits. For empirical support, Braun and Gautschi (2006) refer to the experimental data of Skvoretz and Willer (1993) and compare the experimental observations with the theoretical predictions of the *NCB-Model* and six alternative approaches.⁹ They conclude that the *NCB-Model* performs rather well in predicting profit division in exchange networks and "at least as well as the best fitting published theories" (Braun & Gautschi, 2006, p. 19).

5.3 Trust and Embeddedness

Coordination games and their solution are of focal interest to Game Theory. The coordination of behavior can pose a social dilemma in which all agents would value the outcome of shared investments, but nobody actually prefers to invest. The Trust Game (TG)¹⁰ is an example of such a dilemma. The social dilemma inherent to the Trust Game can be solved if a dyadic exchange relation is embedded in a larger network or a repeated setting. Per definition "[e]mbeddedness refers to repeated transactions over time between the same partners and to transactions between partners who share a network with third parties" (Buskens et al., 2010, p. 310). The authors distinguish two mechanisms through which the social dilemma inherent in the TG can be solved: learning and control. Trustors can *learn* either from fellow trustors or from past behavior of the trustee and they can *control*, i.e. sanction, undesirable behavior if the trust game is repeated. Buskens et al. (2010) implement a finitely repeated trust game with two trustors and one trustee in the lab. They find that trustors trust more often in their trustee if information about previous interactions with a fellow trustor is available (network embeddedness) than when no information can be obtained. Trustees are more trustworthy if their behavior is public information (control). As a result trustors experience that their trust is honored more frequently, inducing them to trust

with a higher frequency in future interactions. Thus, Buskens et al. (2010) attribute higher trustfulness to learning mechanisms rather than control mechanisms. In a subsequent experiment Van Miltenburg, Buskens, and Raub (2012) test whether more experience leads to network control effects of trustors over trustees and find a weak, but not entirely convincing network control effect for the trustor. The authors suggest that experience in general appears to result in behavior that is closer to the expected equilibrium model.

5.4 Coordination through Conventions

Not only embeddedness but also the choice of a *convention*, or norm, to coordinate actions can help to solve a coordination game.¹¹ Conventions are characterized by the fact that most agents would prefer them to be fulfilled, but are hesitant to comply themselves because of the risk that others do not comply. This translates into a coordination problem with two equilibria, a payoff-dominant and a (lower) risk-dominant equilibrium. An agent can either play cooperate or defect (that is, abide by the convention or not). If all other agents defect (cooperate), the risk-dominant (payoff-dominant) equilibrium is reached. Frey et al. (2012) find, contrary to theoretical expectations, that the payoff-dominant equilibrium is selected overwhelmingly often and early in the game. It is also established faster than the risk-dominant equilibrium. Even if deviations from the payoff-dominant equilibrium occur, the agents within the network manage to re-establish it.

Another form of a coordination game is the Chicken Game. The dilemma inherent in this specific coordination problem is that if the most efficient outcome for the dyad is realized, one agent is always worse off than the other. Experimental results obtained by Tsvetkova and Buskens (2013) show that in a repeated game agents manage to coordinate on the use of specific 'conventions' which may also be interpreted as social norms. The convention to alternate actions independently in each relation, representing direct reciprocity, is preferred to the stationary approach to divide all relations in one or the other relation and stick to it, representing indirect reciprocity. Tsvetkova and Buskens (2013) suggest that

9 The alternative approaches are Lovaglia et al.'s (1995) GPI-RD, Yamaguchi's (1996) Power Model, Skvoretz and Willer's (1993) Exchange Resistance Theory, Friedkin's (1992) Expected Value Theory, Cook and Yamagishi's (1992) Equi-Dependence Theory, and Burke's (1997) Identity Theory.

10 In the classical TG two agents interact. Agent A (the sender or trustor) is endowed with a fixed amount of resources. She can choose to send (a fraction of) the endowment to agent B, thereby placing trust in agent B. The amount sent is multiplied by a factor larger than one. Agent B (the receiver or trustee) can then either keep or send (a fraction of) the received amount back to agent A. By sending back resources he proves to be trustworthy. Exchange in trust games happens sequentially and conditionally.

11 A convention may be traffic rules or dressing formal for official functions (Frey, Corten, & Buskens, 2012).

indirect reciprocity only occurs when direct reciprocity is ruled out.

5.5 Coalitions in Social Exchange Networks

A second important application of game theoretical concepts in a network context is coalition formation in asymmetric networks. Under certain conditions, low-power agents are able to reverse the distribution of power in a network through collective action. Emerson (1972b, p. 85) already stated that “when one party has a power advantage based upon alternative relations, this advantage can be reduced if these relations are condensed through coalition.”

The general experimental setup is such that one high-power agent is connected to several weak-power agents with whom she can bargain about the division of a pool of resources in a negatively connected network. If weak-power agents manage to coordinate and form a coalition, they can undermine the power of the high-power agent. Agents within a coalition send a collective offer to the high-power agent and split the outcome of the exchange equally among them. With collective action they avoid the usual bidding war. For a coalition to be stable it needs to reach a minimum size in order to rule out being excluded from exchange. But there is a social dilemma inherent in the process of coalition formation, as an agent excluded from the coalition can free-ride on the coalitions’ offer if the minimum size is exceeded. Consequently, forming a coalition is beneficial for bidders, but free-riding is an individually dominant strategy. Assuming all agents to be rational payoff maximizers everybody prefers to free-ride on the others’ coalition and, therefore, no coalition will be formed, thus preserving the social dilemma.

The first experiment studying how collective action affects power distribution in exchange networks has been conducted by Cook and Emerson (1984), building on the assumptions of *Power-Dependence Theory*. The experimental results show that power-imbalances indeed lead to the formation of coalitions of the weak against the strong and result in an almost equal distribution of profits between the powerful agent and the coalition of weak-power agents. The frequency of coalition formation is highest when power is severely imbalanced and lowest when power is balanced. Simpson and Macy (2001) replicate these findings by including the option to free-ride on the coalition’s offer. Their experimental results do not confirm the predicted instability of coalitions which

are larger than the minimum size. One explanation for this surprising result may be that each agent expects the other agents to defect in the next round, making cooperation the best strategy.

The social dilemma of the bidding-war between weak-power agents can also take the form of a Prisoner’s Dilemma. Cooperation stands for offering exactly half of the points and defection for offering less and free-riding on the other agents’ higher offers. If all weak-power agents offer exactly half of the points, the dilemma is solved by collective action, as the high-power agent is now indifferent between the offers. Defection is individually beneficial, but collective cooperation is the best strategy. Contrary to the weak-power agents, the high-power agent plays a Privileged Game where individual and collective preferences are the same and no dilemma emerges, as she cannot be excluded from exchange through her beneficial position in the network. Borch and Willer (2006) find that through the formation of coalitions, low-power agents can countervail power and play the Privileged Game instead of the Social Dilemma Game.

Also following a game-theoretic tradition, Simpson and Willer (2005) suggest that there are collective goods embedded in certain network structures. A collective good is gained if low-power agents act collectively by forming a coalition. As a result everyone is better off compared to acting individually. The authors introduce a sanctioning system which eliminates potential incentives to free ride. The experimental results show that in positively connected networks, coalition formation has no effect on outcomes. In negatively connected networks, average earnings of low-power agents increase substantially when coalitions are formed. The distribution of power is even reversed with the high-power agent receiving less than half of the pie.

The process of coalition formation can also be influenced by non-structural factors such as social identity (Simpson & Macy, 2004) or the endorsement of the coalition by other agents (Walker & Willer, 2014). The endorsement of a coalition by others is expected to influence an agent’s vote for (or against) the formation of a coalition. In the experiment of Walker and Willer (2014) weak-power agents are informed about the preferences of the other low-power agents regarding the formation of a coalition before casting their vote.¹² The authors find that legitimacy enhances coalition building. However, coalitions are more likely to be formed in small networks than in larger networks. While coalitions in large networks countervail power, the effect is reversed

¹² Note that the preferences communicated to the agents are not the real preferences elicited from the other group members but preferences generated by the experimenter.

in small networks. Simpson and Macy (2004, p. 1400) conclude that “[e]xchange network theories must move away from the traditional conception of social structures as fixed and unyielding.”

5.6 *New Perspective and Outlook*

The fact that the structure of a network affects the behavior of its agents has been well established. However, the assumption that network structures are static has already been questioned by researchers considering the formation of coalitions (Buskens, Corten, & Raub, 2014) and the endogenous formation of networks is attracting more and more interest.¹³ Because the endogenously emerging structure still influences the agents’ behavior, the complexity of models of social exchange is increasing substantially. Every change in the structure of the network can shuffle and reshuffle opportunities, dependencies and power. Therefore, experimental tests may be much more challenging and problematic. One way forward is to use computational simulations to tackle the complexity of new models, a tool which is also increasingly used in social network analysis, as simulations allow for the examination of large structures.

Not only the endogenous emergence of a network’s structure is of great interest, but also the behavior leading to the formation of certain network structures and, furthermore, how network formation can be used to solve coordination problems (Raub et al., 2013). Van Dolder and Buskens (2014) examine experimentally whether agents deviate from their preference for profit maximization in a setting of dynamic network formation but find no evidence supporting their hypothesis. Corten and Buskens (2010) study whether and how agents solve a coordination problem in a network by changing the network structure. They find that agents form ties with other agents playing the same strategy (cooperate or defect) and cut ties with those agents playing the other strategy. Agents manage to coordinate on the payoff-dominant equilibrium with higher frequency than expected, thereby suggesting that agents are not as myopic as assumed.

Further experimental studies dealing with social network exchange in general and endogenous network formation in particular are expected to be published rather soon, since several new theoretical models have been published recently (e.g. Frey, Buskens, & Raub, 2015; Raub et al., 2013; Raub, Frey, & Buskens, 2014).

6. Concluding Remarks

In this article, we summarize the rich variety of experimental studies conducted in the field of social exchange research. In the early stages, social exchange research evolved relatively close to social network analysis in its research interests. The structure of a network and its implications for exchange outcomes was of focal interest. Over time, the level of analysis expanded from the meta-level of the network, to the micro-level of individuals, relations, and the value of relations for individual agents. By equipping agents with preferences and emotions, the horizon of social exchange theories expanded, but also moved this strand of research further away from a purely structural perspective. Recent developments, especially by scholars using game theory as a tool for analysis, show a shift back to research questions examined by classical social exchange theorists, such as the endogenous emergence of network structures or the study of larger networks.

Several streams of research have evolved in parallel academic worlds without taking much notice of each other’s research. However, a more positive reading of the history of social exchange research would suggest that this high degree of self-referential closure may have helped the research programs mature until their findings have become sufficiently robust to fruitfully and confidently confront other perspective and contributing to cumulative knowledge. Recent contributions integrating elements of different research traditions show that the patience of the cumulative work on social exchange networks pays off by generating well-scrutinized propositions and solidly founded theories.

One shortcoming of social exchange theory may be that it has, for a long time, limited itself to very simple network structures of little interest to scholars in network analysis. But the complexity of larger networks mandates substantial departures from the standard theories and methods. Models become analytically intractable and numerical approaches are needed to derive testable predictions. Moreover, simple network experiments are limited in their capacity to reconstruct the theoretical network structures in the laboratory. Social media and other web-based networks may constitute a certain potential for studying and testing these new research questions. Nevertheless, modern social exchange research has much to offer to network analysis with respect to the

¹³ In economics, the research on network formation has been expanding over the past years. See for example Berninghaus, Ehrhart, and Ott (2006); Callander and Plott (2005); Carrillo and Gaduh (2012); Falk and Kosfeld (2012); Goeree, Riedl, and Ule (2009); Hauk and Nagel (2001); Kirchsteiger, Mantovani, Mauleon, and Vannetelbosch (2013). For an earlier review, see Kosfeld (2004).

analysis of the social consequences of network structures. More than half a century after the founding fathers of social exchange research published their first ideas, the research area is still an expanding area of research. But beyond that, it was exactly the stepwise, cumulative and, in particular, patient approach taken by the researchers in this field, which now places the next generation into a position to engage in even broader and interdisciplinary discourse, which may eventually lead to an even better understanding of human interaction in social contexts.

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