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Barrera, Davide

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The impact of negotiated exchange on trust and trustworthiness☆

Davide Barrera*

ICS/Department of Sociology, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

Abstract

Negotiated exchanges and trust problems can be regarded as two different forms of exchange, the former representing exchanges with negotiation and binding contracts, the latter representing asymmetric transactions in which one actor has the opportunity to deceive the other. Both forms of exchange have been extensively studied, but the two respective research traditions exhibit very little overlap. In this paper, we investigate the effects of negotiated exchanges in different network structures on the development of mutual trust. We derive hypotheses from various theories and test them by means of an experiment in which subjects first undertake a series of negotiated exchanges under different power conditions, and then face a trust problem with one of the actors that have been involved in the previous exchanges. The trust problem is operationalized by means of the Investment Game which allows us to look separately at trust and trustworthiness. Our results demonstrate that negotiated exchanges increase mutual trust, but not trustworthiness.

Keywords: Negotiated exchange; Power; Trust; Trustworthiness; Investment Game

1. Introduction

Since the beginning of the eighties "social exchange" and "trust" have been extensively studied by scholars from different disciplines such as sociology, social psychology, economics, and business administration. The social exchange tradition concentrated predominantly on negotiation in small exchange networks. Research on trust, on the other hand, has mainly focused on the role of trust as a "lubricant for cooperation" (Arrow, 1974; p. 23). Albeit many social exchanges in

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* Tel.: +31 30 253 4831; fax: +31 30 253 4405.
E-mail address: D.Barrera@uu.nl.
URL: http://www.fss.uu.nl/soc/iscore.

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real-life involve trust (e.g., economic transactions or labor relations), the two topics have been continuously kept separated and the two research traditions exhibit very little overlap (Molm et al., 2000; Kollock, 1994 are two exceptions). Research on social exchange focuses on exchanges that involve negotiation and result in binding agreements. Conversely, research on trust focuses on exchanges that do not necessarily involve negotiation and result in non-binding agreements. Thus, in negotiated exchanges, actors typically cannot deceive each other, whereas the risk of deception is one of the key features of trust problems. However, the distinction between trust problems and negotiated exchanges is never so sharp in real-life situations. For example, two firms engaged in an economic transaction with each other might undertake extensive negotiations over the specific terms of the exchange and draw up a detailed contract specifying reciprocal obligations, thus minimizing the risk of deception. On the other hand, if the two firms have an established commercial relation involving repeated transactions, they might come to learn about the trustworthiness of the partner and develop some form of mutual commitment economizing on the legal expenses for writing extensive contracts (see Macaulay, 1963 for a classical study of the role of legal sanctions in exchange relationships). In this way, a relationship regulated by fully binding agreements can develop into a relationship based on mutual trust.[1] Nevertheless, the two firms could bargain from different power positions, for example, because alternative exchange partners are available to only one of them. How would the negotiation between two such partners affect the development of mutual trust?

Research on the effects of negotiation in exchanges concerns, on the one hand, social psychological literature on the development of commitments and group formation (Lawler and Yoon, 1993, 1996, 1998; Lawler, 2001) and, on the other hand, research on economic contracts (Sitkin, 1995; Malhothra and Murnighan, 2002). The first line of research has paid little attention to the emergence of interpersonal trust, focusing instead on the effects of repeated exchanges between actors embedded in different types of power relationships on relational commitment and affection. The body of research produced in this line indicates emotions that are associated with the exchange as the explanatory mechanism for the development of committed relationships (see Thye et al., 2002 for a review of the research program). The second line of research focuses on the effects of negotiation and contracts on trust. In the literature on contracts, two contrasting arguments are found: one stressing the positive effects of contracts on trust, the other emphasizing the negative effects. The "positive effects" argument claims that contracts are used to overcome initial trust problems in economic transaction. Thus, contracts are useful in order to establish cooperation between strangers (see Sitkin, 1995 for an example in this line of research). The counterargument focuses on the importance of risk in the development of trust relations. According to this argument, when actors have the possibility and the incentive to deceive their partners but keep themselves from doing it, they are showing that they can be trusted. Therefore, the option for the actors to deceive their partner is considered an essential element for the development of a trusting relation and formal contracts, insofar as they remove this option, do not allow trust to develop (Malhothra and Murnighan, 2002). Theoretically, assuming that actors cannot assess their partners' trustworthiness if they do not run the risk of being deceived, two scenarios are possible: either the level of interpersonal trust does not change after negotiated exchanges have taken place, or the level of interpersonal trust decreases after actors have had negotiated exchanges resulting in binding agreements. According to the first scenario, the effects of contracts on interpersonal trust

[1] Consistent with this argument, contractual safeguards have been studied as means to reduce trust problems while the extent of formal safeguards in contracts has been taken as a measure for lack of trust (Buskens, 2002, Chapter 5; Batenburg et al., 2003).

would actually be null rather than negative, while they would be truly negative only in the second scenario. However, the second scenario requires some additional assumptions about the actors' cognitive response to contracts, for example framing effects: a request of a contract contemplating all possible mishaps and deceptions might convey a non-cooperative signal to the partner (Lindenberg, 2000), or cause her attention to focus more on the risks involved in the transaction, so that, once the contract is removed, trust is more problematic. Nevertheless, in the literature these two scenarios are not theoretically distinguished (e.g., Molm et al., 2000; Malhothra and Murnighan, 2002). The main aim of this study is precisely to look at whether the effects of negotiation on trust are positive, negative, or null. We test these three alternative hypotheses against each other by comparing levels of trust between pairs of actors who underwent negotiated exchanges and pairs of actors who did not have any previous exchange with each other. Additionally, we adopt an experimental design that allows us to test whether power differences between negotiating actors affect trust and in which direction.

In one of the few studies that focused on the effects of repeated exchanges on the emergence of commitment and mutual trust, Molm et al. (2000) measured trust by means of a single-item attitudinal question. However, in a recent study about the measurement of trust, Glaeser et al. (2000) found that attitudinal measures of trust predict trustworthy behavior better than trusting behavior. Therefore, we apply a behavioral measure of trust in order to overcome potential validity problems concerning attitudinal measures of trusting behavior: we operationalize trust using the Investment Game devised by Berg et al. (1995). This design also allows us to analyze separately the effects of negotiated exchanges on trusting as well as trustworthy behavior.

2. Theories and hypotheses

Before we outline our theoretical arguments we will now briefly introduce negotiated exchanges and trust and describe the Investment Game, which we also adopt in the experiment to obtain behavioural measures of trust and trustworthiness. Research in network exchange has focused especially on the development of theoretical models predicting the division of a given pool of resources in negotiated exchanges. The experimental manipulation of simple networks allows scholars to study human activity, such as power exercise, resulting from restrictions imposed by given social structures. Actors exercise power exploiting the opportunities that the structure offers to them in order to obtain greater benefits from the interaction (see Willer, 1999). Network exchange theorists usually consider settings in which actors are embedded in a given network structure that specifies exchange relations available to them. Formalized theoretical models are used to predict actual exchanges and their outcomes and the predictions are tested in laboratory experiments. The exercise of power is inferred from the transfer of valued resources observed between actors embedded in a network. Actors high in power gain most of the resources available to the exchange. Assuming that individuals try to maximize their earnings, power in exchange networks depends on the possibility that one or more actors are excluded from exchange. A network in which, under specific exchange conditions, one or more actors are necessarily excluded is called *strong power*. More precisely, "a network is strong power if and only if (1) its positions can be divided into one or more high power positions that are never excluded, (2) two or more low power positions, at least one of which is always excluded, and (3) low power positions can exchange only with high power positions" (Willer, 1999, pp. 56–57). For example, Fig. 1a represents a simple dyad in which the two positions A and B are perfectly identical. Such an exchange relation does not contain power differences, therefore the exchange rate between A and B is the equal power ratio and the relation AB is called *equipower*. Fig. 1b, on the other

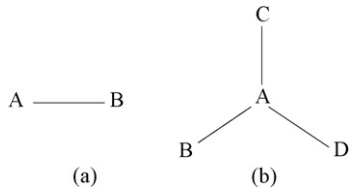

Fig. 1. Network structures: equal power vs. strong power. (a) Dyad and (b) Branch31.

hand, represents a four actors network called branch31. If the actors in this network are allowed to complete only one exchange, position A has a structural advantage over the three peripheral actors, because two of them will necessarily be excluded from exchange while A can never be excluded. Thus, actors occupying positions B, C, and D will offer exchange rates increasingly favoring actor A trying to avoid exclusion, and actor A will gain most of the resources available to the exchange. Therefore, position A is high in power while positions B, C, and D are low in power. Several contrasting theoretical models to predict rates in negotiated exchanges have been proposed. Although they are based on different assumptions about the actor, most of these theories make rather accurate predictions on the division of resources for these simple networks. For a comparison of most of these theories see Lovaglia et al. (1995) and Skvoretz and Willer (1993) or the special issues of *Social Networks* 14, No. 3–4.

Following Coleman (1990, Chapter 5), we conceptualize trust as an interaction involving two interdependent actors. According to Coleman, a trust problem is defined by four characteristics: (1) actor 1 (Ego) has the possibility of placing some resources at the disposal of actor 2 (Alter), who, in turn has the possibility to honor or abuse trust; (2) Ego prefers to place trust if Alter honors trust, but regrets placing trust if alter abuses it; (3) there is no binding agreement that protects Ego from the possibility that Alter abuses trust; (4) there is a time lag between Ego's and Alter's decision. This definition is consistent with the game-theoretic formalizations of the *Trust Game* (Camerer and Weigelt, 1988; Dasgupta, 1988; Kreps, 1990) and the *Investment Game* (Berg et al., 1995). These two games differ because, in the Trust Game, "trust" and "trustworthiness" are represented by dichotomous choices – trust versus no trust, honor versus abuse – while the Investment Game exhibits some quantitative variation both in placing trust and in honoring or abusing trust. Since we prefer to have such a continuous measure for trust and trustworthiness, we employ the Investment Game in our theoretical analysis as well as in our experiment.

In the Investment Game, the two players start with an initial endowment E_i. Ego then may send all, some, or none of her endowment to Alter.[2] The amount of money that she decides to send, denoted S_1, is then multiplied by a factor m (with $m > 1$). Alter receives an amount equal to m times the amount sent by Ego. Then he can decide to send back to Ego all, some, or none of the money he has received. The amount returned by Alter – denoted R_2 – is not multiplied. After players have chosen their actions, the game ends and the payoffs are computed. The payoff earned by Ego is $E_1 - S_1 + R_2$, while the payoff earned by Alter equals $E_2 + mS_1 - R_2$. The amount that Ego is willing to send to Alter indicates the extent to which Ego trusts Alter. Therefore, we refer to Ego's choice S_1 as *trust*. Conversely, the amount that Alter is willing

[2] For clarity, in the description of the Investment Game, we use the female pronoun for the sender (Ego) and the male pronoun for the receiver (Alter).

to return to Ego represents Alter's trustworthiness. Therefore, we refer to Alter's choice R_2 as *trustworthiness*.[3]

Assuming perfect information and a one-shot non-cooperative game, Alter maximizes his revenues by keeping everything Ego has sent him, thus choosing $R_2 = 0$. Consequently, knowing the structure of the game and anticipating Alter's behavior, Ego will maximize her revenues by choosing $S_1 = 0$, since $E_1 - S_1 < E_1$ if $S_1 > 0$. Therefore, "Send nothing" and "Return nothing" are the equilibrium choices and the payoffs at equilibrium are E_1 and E_2. This outcome is Pareto-suboptimal, because both actors would prefer the payoffs yielded in the situation in which trust is placed and honored, $E_1 - S_1 + R_2$ and $E_2 + mS_1 - R_2$, with $S_1 > 0$ and $R_2 > S_1$.

This standard game-theoretic analysis of a trust problem applies to an isolated encounter between two strangers. However, in real-life situations, trust problems are likely to occur between actors who are embedded in a more complex setting (Granovetter, 1985). Two types of embeddedness can affect trust problems (Raub, 1997; Raub and Weesie, 2000; Buskens and Raub, 2002; Barrera, 2005): first, Ego and Alter can meet repeatedly (dyadic embeddedness), and second, Ego and Alter may have common acquaintances (network embeddedness). In negotiated exchanges both these aspects are present, in fact actors negotiate and exchange repeatedly with each other and they are embedded in small social networks. For trust problems occurring in such embedded settings, some theoretical mechanisms based on different assumptions – i.e., partly altruistic instead of purely selfish actors (e.g., McClintock, 1972), backward-looking rationality instead of forward-looking rationality (Macy and Flache, 2002) – have been postulated. For a discussion of some of these mechanisms and empirical tests we refer to Buskens and Raub (2002) and Barrera (2005), since such a discussion exceeds the scope of this article. However, we want to stress here that if actors are assumed to be heterogeneous, i.e., some are assumed to be (partly) altruists, and to apply backward-looking rationality, a common past might have an influence on the actors' decisions in a one-shot Investment Game. We will return to this point when discussing some of our hypotheses.

Most of the literature on social exchange is generally silent about the consequences of negotiated exchanges on trust and in particular about the effects of power differences on the development of interpersonal trust. However, some scholars have investigated the effects of repeated exchanges on the development of durable relations, as a means to reduce uncertainty involved in the exchange (Kollock, 1994; Molm et al., 2000) or as an affective link developed through positive emotions that actors have experienced in repeated exchanges (Lawler and Yoon, 1993, 1996, 1998; see also Thye et al., 2002 for a review of the research program on "Relation Cohesion Theory"). All these theories assume that actors try to maximize their earnings, although some theories add supplementary assumptions, such as the influence of emotions.

Building on Yamagishi and Yamagishi (1994) distinction between trust and assurance, and in line with Kollock (1994) argument on uncertainty reduction, Molm et al. (2000) state that trust develops only under the condition of risk that is only if actors are liable to be exploited by their partners.[4] Accordingly, negotiated exchanges can only provide assurance because actors who complete a series of negotiated exchanges have no means to infer their partners' trustwor-

[3] In the economic literature, R_2 is most often labeled *reciprocity* (e.g., Berg et al., 1995). Because this term implies some psychological speculation about the cause of Alter's choice R_2 that we do not consider, we opted for the more neutral *trustworthiness*.

[4] In Yamagishi and Yamagishi's (1994, p. 132) terms, trust is "[an] expectation of goodwill and benign intent", whereas assurance is ". . . an expectation of benign behavior for reasons other than goodwill of the partner . . . [and] is based on the knowledge of the incentive structure surrounding the relationship."

thiness, since these exchange agreements are fully binding. Thus, they conclude that "... the very mechanisms that were created to reduce risk in transactions – the negotiation of terms and strictly binding agreements – have the unintended consequences of reducing trust in relationships" (Molm et al., 2000, p. 1398). However, in their experiment, Molm et al. only compare levels of trust between actors who experienced reciprocal and negotiated exchanges.[5] Therefore, the results of their experiment do not rule out the possibility that negotiated exchanges still may have a positive effect on trust, though smaller than the one observed after a series of reciprocal exchanges. Similarly, Malhotra and Murnighan (2002, p. 537) claim that "Trust can only develop when the parties have an incentive and an opportunity not to cooperate. ... Thus, the presence of a contract that restricts exploitation and opportunism may make trust development very difficult." This conclusion is supported by experimental evidence in which transactions with and without risk are compared. However, in the experiments presented by Malhothra and Murnighan (2002) subjects interacted with computers and no negotiation over the terms of the exchange took place. Therefore, also their evidence does not rule out the possibility that negotiation may have positive effects on trust, even though these positive effects may be smaller than those observed after risky transactions. Summarizing, if the argument of "no trust without risk of deception" holds, then actors involved in repeated negotiated exchanges should display the same level of mutual trust as strangers who meet for the first time and had no previous relations. Alternatively, if negotiation and binding agreements are even damaging trust as Molm et al. (2000) and Malhothra and Murnighan (2002) seem to suggest, the level of mutual trust between actors involved in repeated negotiated exchanges should be even lower than the level of trust existing between two strangers.

Conversely, relational cohesion theory argues that actors who exchange repeatedly with each other experience emotions, which they attribute to the relation, which, in turn, achieves an expressive value (Lawler and Yoon, 1993, 1996, 1998). Thus, actors involved in repeated negotiated exchanges should develop mutual trust as a by-product of the exchange process. Since various theoretical arguments leading to different hypotheses can be found in the relevant literature, we present here three competing hypotheses concerning the effects of negotiation and exchange on mutual trust. In statistical terms, the first hypothesis, predicting no difference in the level of trust and trustworthiness between actors who have undergone negotiated exchanges and perfect strangers, is the null hypothesis.

Hypothesis 0. Actors who underwent repeated negotiated exchanges are as trusting and trustworthy as perfect strangers.

Hypothesis 1a. Actors who underwent repeated negotiated exchanges trust each other less and are less trustworthy than perfect strangers.

Hypothesis 1b. Actors who underwent repeated negotiated exchanges trust each other more and are more trustworthy than perfect strangers.

Until now, our discussion has focused mainly on the problem of whether negotiated exchanges could have any influence on the level of interpersonal trust between the exchanging actors. In the remainder of this section, we will analyze to what extent this influence may depend on what specifically happened during the exchange period preceding the trust problem.

[5] Negotiated exchanges involve a bargaining phase possibly ending with binding agreements between exchanging partners, such as actor A selling a good to actor B. Reciprocal exchanges are sequential unilateral transfers of benefits over time between two exchanging partners such as actor A helping actor B at time t and actor B helping actor A at time $t+1$ (Molm and Cook, 1995; Molm et al., 2000).

Exchange networks can differ with respect to the power actors are able to exercise in order to increase their profit from exchange. Here, we focus on equal power networks and networks with extreme power differences, i.e., strong power networks. The effect of power on trust has been largely neglected in the literature on social exchange. In one of the few exceptions, Molm et al. (2000) argued that power inequality decreases mutual trust, but they focused on reciprocal exchanges and did not look at equal power relations. The idea that equal power relations should yield more mutual trust is also consistent with relational cohesion theory. Lawler and Yoon (1993, 1996, 1998) argue in fact that equal power relations increase the frequency of exchange, and higher frequency of exchange implies more earnings, more positive emotions, and hence more interpersonal trust. Assuming that the amount of resources earned by actors through the exchange is a good individual indicator for the success of the exchange relation, we pose the following hypothesis for actors embedded in an equal power relation:

Hypothesis 2. The higher the earnings from exchange in equal power relations, the more the actors embedded in such relations will trust each other and the more trustworthy they will be.

However, relational cohesion theory takes the dyad as unit of analysis and hence it does not make distinct predictions for the two members of the exchange relation. For equal power relations this is not a problem, because in equal power relations the positions of the two actors are perfectly symmetric with respect to power, therefore the effect of power on interpersonal trust is the same for the two actors and there is no need to make separate predictions for A's trust in B and B's trust in A. Conversely, predictions for trust relations among actors embedded in strong power networks are more complex, due to the power asymmetry among the actors. For example, assuming that A and B are two actors in a strong power network, and that A is a high power actor and B is a low power actor, A's trust in B and B's trust in A may be differently affected by power inequality. Relational cohesion theory argues that power inequality decreases mutual trust, but since it takes the dyad as a unit of analysis it does not allow predictions at the individual level. Following Weiner (1986) attribution theory, Lawler (2001) listed emotions that can be experienced in exchange relations connecting them with the relevant social object: positive emotions such as pleasantness, pride, gratitude and affective attachment or negative emotions such as unpleasantness, shame, anger or affective detachment can be directed at the task, the self, the other or the social unit (i.e., the dyad). In addition, in his "Affect Theory" of exchange, Lawler argued that when fulfilling joint tasks characterized by a high level of shared responsibility for the success or failure, actors will tend to attribute the resulting feelings to the social unit (i.e., dyad, group, networks) rather than to one's self or to the other (the exchange partner). However, a trust relation is a relation directed towards an individual actor rather than a social unit, therefore it should not be affected by emotions that are attributed to a different social object. If we assume that actors in repeated exchanges experience not only "global" emotions that they attribute to the social unit, but also other emotions that they attribute to themselves or to the other, we can expect that, if they are confronted with a trust problem concerning the same other with whom they had negotiated exchanges before, emotions attributed to the other will be more salient. According to Lawler (2001), these emotions attributed to the other could include "gratitude" if the exchange was successful or "anger" if the exchange was not successful. This conjecture could help us to generate hypotheses about trust in relations for actors who previously exchanged in strong power networks. Earlier experiments have shown consistently that actors high in power are always able to exchange in such networks and obtain a greater share from the exchange. Conversely, actors low in power are either excluded from the exchange or they are only able to obtain small amounts of points (Willer, 1999). Therefore, an actor high in power will experience predominantly positive emotions due to high frequency of

exchange and high earnings. A low power actor, in turn, will experience predominantly negative emotions due to exclusion and low earnings. There is some empirical evidence that low power actors indeed experience negative emotions (Willer et al., 1997). Assuming that the amount of resources earned by actors through the exchange is a good individual indicator for the success of the exchange relation, we propose the following hypotheses for high and low power actors embedded in strong power networks:

Hypothesis 3. The more a high power actor has earned from exchanges with a low power actor, the more the high power actor will trust the low power actor, and the more trustworthy the high power actor will be.

Hypothesis 4. The more a low power actor has earned from exchanges with a high power actor, the more the low power actor will trust the high power actor, and the more trustworthy the low power actor will be.

Finally, we examine a trust problem involving two low power actors. Low power actors do not have the possibility to exchange with each other; therefore, they do not have reasons to attribute positive or negative emotions associated with the exchange relations to other low power actors. The only information concerning other low power actors available to them stems from the observation of the other low power actors' bargaining behavior in exchanges with the high power actor. However, since low power actors typically bid against each other in order to be included in the exchange with the high power actor, their earnings will decline to the advantage of the high power actor, if the competition is fierce. Assuming that a low power actor could consider the other low power actors partially responsible for the little she managed to earn in the exchange, we propose the following hypothesis concerning effects on a trust relation between two low power actors.

Hypothesis 5. The less low power actors have earned in exchanges with a high power actor, the less they will trust each other and the less trustworthy they will be.

As stated above, when introducing the Investment Game, standard forward-looking rationality, usually assumed in Game Theory, predicts no trust and trustworthiness at equilibrium. Moreover, standard forward-looking rationality predicts that players' choices in the Investment Game should be unaffected by whatever happens before the Investment Game. However, several experiments have shown that (1) a considerable proportion of subjects cooperate when strategic rationality predicts they should not and (2) pre-game experiences do affect subjects' decisions (Colman, 1982). In order to account for these empirical anomalies, some scholars proposed models that replace the assumption of purely selfish preferences with (partly) altruistic preferences. These models assume that subjects are not only interested in their own outcomes, but also in the outcomes obtained by the other player, by means of some value transformation. For example, a value transformation introduced by McClintock (1972) assumes that the utility of an actor associated with the outcome of a strategic interaction involving a second actor is a function of both her own payoff and the payoff earned by the second actor. The dependency of individual utility on the welfare of the partner is referred to as the actor's social orientation. Other scholars have modeled the individual utility function incorporating different types of altruistic preferences, such as fairness (Rabin, 1993) and equity or inequality-aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Since we are studying a situation in which the actors playing the Investment Game have a common past, our experiment is particularly suitable to test hypotheses based on such kind of altruistic models of actors. Hereafter, we will generally refer to actors characterized

by partly altruistic preferences as prosocials, and to selfish actors who are purely interested in maximizing their own outcomes as individualists (e.g., Van Lange et al., 1997; Van Lange, 1999).

If some actors have different, prosocial preferences, i.e., with a taste for equity and/or fairness, "send nothing" is not necessarily the only equilibrium choice of the Investment Game. On the one hand, a prosocial Ego, being interested in Alter's wealth, might send a positive amount, irrespective of the expected amount returned. On the other hand, a prosocial Alter, whose preference for fairness or equity is strong enough, will return a positive amount to Ego. Finally, also an individualistic Ego, who is purely interested in her own wealth, will send a positive amount if she believes that she is dealing with a prosocial Alter. Thus, the trustworthiness of Alter – the amount he wishes to return to Ego – is influenced by his own social orientation and preference for equity and fairness that is by how much he is interested in the outcome obtained by Ego. Consequently, Ego's trust in Alter – the decision concerning how much she wishes to send him – will be affected not only by her own social orientation and preferences, but also by her belief about Alter's social orientation and preferences. Given the common history the actors share, the bargaining behavior of Alter, observed during negotiated exchanges, could influence Ego's beliefs about social orientation and social preferences of Alter, and consequently it could influence Ego's trusting decision in the Investment Game. Therefore, we propose the following two hypotheses for the effect of own social preferences and for the effect of beliefs concerning social preferences of the partner, respectively.

Hypothesis 6. The fairer the offers by Ego in previous negotiated exchanges are, the more Ego will trust Alter.

Hypothesis 7. The fairer the offers by Alter in previous negotiated exchanges are, the more Ego will trust Alter and the more trustworthy Alter will be.

3. Method

In order to test the hypotheses about effects of power in negotiated exchange on the development of interpersonal trust we designed a laboratory experiment consisting of two phases. In the first phase, subjects negotiate the division of a pool of points under different network conditions. After completion of the exchange phase, subjects play two Investment Games (Berg et al., 1995) – first in the role of Ego and then in the role of Alter – with one of the persons with whom they exchanged in the first phase. Actors who exchanged in dyads are simply re-matched with the same partner, actors who exchanged in larger networks are matched randomly with another member of the same exchange network. At the beginning of the Investment Game, subjects are informed about who their partner will be. In order to ensure that subjects know they are playing with a person they have already met in the exchange phase, we use the same labels throughout the whole experiment. The behavior of subjects in the Investment Game is compared with that of a control group playing the Investment Game without the initial phase of negotiated exchange.

3.1. Experimental procedure

A total of 144 subjects (undergraduate students) participated in the experiment. The first phase of the experiment is entirely computer based. Before the beginning of the negotiations, actors run a tutorial from which they learn how to send and accept offers using ExNet, a system of networked PCs commonly used to run exchange experiments (Willer, 1999). The tutorial also informs the subjects that they will partake in 15 negotiation rounds, and that in every negotiation they can split a pool of 24 points. Every negotiation round lasts up to 2 min, during which they can send an

unlimited number of offers to each other until an agreement is reached or the time is over. Subjects participating in the experiment are fully informed about their own offers as well as about offers sent and received by all other subjects in their network. Their computer screen displays the experimental network and continuously updates the status of all offers and agreements reached. Subjects are also told that the points earned in exchanges will be translated into money at a fixed exchange rate, but they are not informed about the real value of every point before the end of the exchange phase, in order to draw their attention to the second phase where the stakes are much higher. Moreover, to avoid subjects trying to build up a cooperative reputation in the exchange phase to exploit their partner's trust in the Investment Game, subjects are not informed beforehand that they will play the Investment Game at the end of the exchange phase. To study the effects of power on trust, we implemented the negotiated exchange in two different network structures: a *strong power* and an *equal power* (see Fig. 1). We use a *branch31* for the strong power and a simple *dyad* for the equal power structure. This design allows us to compare levels of trust and trustworthiness in network structures after completion of a series of exchanges under equal versus strong power conditions. In a third treatment, we let pairs of subjects play the Investment Games without the previous phase of exchange. This treatment provides us with a benchmark representing the level of trust and trustworthiness between *strangers* without experience of exchange and power within a network.

The second phase of the experiment is paper and pencil. At the end of the exchange phase, the experimenter walks into the cubicle, informs the subjects about the second phase of the experiment, and gives them written instructions. At this point, subjects are also informed about the exchange rate applied to the points that they earned in the first phase: US$ 0.01 per point earned in the exchange. The second phase of the experiment consists of two one-shot Investment Games in which every subject first plays as Ego, and then plays as Alter. Instructions for the two Investment Games are also given in two parts. First, all subjects are Egos, they receive US$ 2.50 as initial endowment and they can decide to send a certain amount of their endowment to their partner, in any multiple of 50 cents. They are also told that the amount they decide to send will be multiplied by three by the experimenter and that their partner then decides how much he will return. Subjects are not informed in the first part of the instructions that they will subsequently play as Alters themselves with the same partner because this might induce a feeling of "reduced responsibility" that would push the subjects to behave more opportunistically (Burks et al., 2003).[6] For the returning choice in the Investment Game, we used the *strategy method* (Selten, 1967): every Alter decides on a contingent action for every possible decision of Ego. In the second instructions sheet, subjects are required to fill in each amount that they would return to Ego for every possible amount that Ego could send. Subjects are paid for the two Investment Games, played as Ego and Alter, respectively. Since Alters' decisions are collected with the strategy method, the amount returned corresponding to the actual amount sent by Ego is implemented and paid. The experiment ends with a small questionnaire about personal characteristics.

Given the design we chose for the second phase of the experiment, we obtain effectively a clean measure of the trusting decisions of all our subjects in a one-shot Investment Game. It is a *one-shot* Investment Game because our subjects did not know that a second Investment Game in the role of Alter would follow. Conversely, although we stress in the instructions that the two Investment Games are completely independent from each other, the returning decisions are

[6] In an experiment specifically designed to test the effects of different procedures, Burks et al. (2003) found that playing an Investment Game in both roles reduces the amount returned. Moreover, if subjects are informed beforehand that they will play both roles, the amount sent decreases as well.

effectively individual measures of trustworthiness in the second game of a *two-shots* Investment Game, because all subjects make their returning decision *after* their sending decisions. However, for the same reason, these returning decisions are made without knowing how much their partner returned in the first Investment Game. Moreover, hoping to improve the quality of our measurement for trustworthiness, we decided to use the strategy method (Selten, 1967) for the returning decision, thus obtaining five returning decisions per every subject, one per every possible amount sent by Ego. We are aware that this design makes our measure for trustworthiness somewhat less "clean", but we preferred to have two decisions (trust *and* trustworthiness) for every actor within a dyad, rather than letting our subjects play a simple one-shot Investment Game and then having only one decision (trust *or* trustworthiness) for every actor.[7] Moreover, there is some evidence that the use of the strategy method does not induce different behavior in the experimental subjects (Brandts and Charness, 2000; Cason and Mui, 1998).

Our unit of analysis consists of a directed dyad. In fact, for any given pair AB, two sending decisions and two returning decisions are observed. First, A sends to B and B sends to A. Then, A returns to B and B returns to A. Given the setting of the first phase described above, five different pairs of matches are possible with respect to relative power within the relation. Subjects who did not run the exchange phase (strangers) have a null relation with respect to relative power. Subjects who partook in the exchange phase in dyads are matched with each other in the second phase and have an *equal* relation with respect to relative power. All groups of four subjects who ran the exchange phase in branch31 networks can be matched in two types of relations differing with respect to relative power: a low power actor with the high power actor and a low power actor with another low power actor. Two low power actors form a symmetrical directed relation: *low to low* (LTL hereafter). A low power actor and the high power actor form two directed relations differing with respect to relative power: *high to low* (HTL) and *low to high* (LTH). Given a match AB in which A is a high power actor and B is a low power actor, A's trust in B and B's trust in A are analytically different and they are analyzed separately.

Out of 144 subjects participating in our experiment, 72 partook in the first phase in branch31 networks, 36 in dyads and 36 in the strangers treatment. Therefore, counting the single Investment Games, we have 36 Investment Games between strangers; 36 between actors who experienced repeated negotiated exchanges in an equal power relation; 36 between 2 low power actors (LTL) who experienced negotiated exchanges in a branch31 network; 18 between an Ego who experienced negotiated exchanges in a branch31 network as a low power actor, and an Alter who experienced negotiated exchanges in a branch31 network as a high power actor (LTH); 18 between an Ego who experienced negotiated exchanges in a branch31 network as a high power actor, and an Alter who experienced negotiated exchanges in a branch31 network as a low power actor (HTL).

3.2. Operationalizations

The amount sent by each subject in the role of Ego is the individual measure for trust that we use as dependent variable in the regression models presented in the next section in Table 1. Trustworthiness is the amount returned. Since we used the strategy method for trustworthiness, subjects made 5 decisions, one per every possible value of the amount sent by the partner in the Investment Game. In the regression models presented in the next section in Table 2, we

[7] The instructions used for the Investment Game can be obtained contacting the author.

Table 1
Linear regression models on trust (144 subject, 54 networks)

Hypotheses	Independent variables	Expected sign	Coeff. (standard error)			
			Model 1	Model 2	Model 3	Model 4
H0–H1a–H1b	Equal	0 − +	0.86** (0.347)	0.72** (0.343)	0.86*** (0.321)	0.71** (0.315)
H0–H1a–H1b	HTL	0 − +	0.75** (0.361)	0.72** (0.356)	0.77** (0.326)	0.73** (0.327)
H0–H1a–H1b	LTH	0 − +	0.14 (0.420)	0.34 (0.476)	0.43 (0.483)	0.25 (0.479)
H0–H1a–H1b	LTL	0 − +	0.11 (0.333)	0.03 (0.339)	0.08 (0.331)	0.17 (0.334)
H2–H3–H4–H5	Individual earnings	+		0.22 (0.192)	0.19 (0.192)	−0.22 (0.266)
H6	Average offer by Ego	+		0.22 (0.143)	0.24* (0.143)	0.28** (0.137)
H7	Average offer by Alter	+		0.21 (0.131)	0.25* (0.134)	0.05 (0.140)
	Sex (female = 1)				−0.49 (0.307)	−0.45 (0.308)
	Trust (knowledge-based)				0.24* (0.124)	0.27** (0.127)
	Trust (general)				0.26* (0.137)	0.22* (0.132)
(H2–H3–H4)[a]	Individual earnings × same partner	?[a]				0.75** (0.281)
	Constant		10.97*** (0.203)	10.97*** (0.205)	20.25*** (0.323)	20.23*** (0.323)
R^2			0.056	0.089	0.151	0.178

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$ two-sided significance based on Huber standard errors modified for clustering within networks.

[a] This term shows how the effects of earnings postulated by Hypotheses 2–4, differ between subjects depending on whether they played the Investment Game with the same subject with whom they had exchanges.

summarized these five decisions into one variable taking the average proportion returned. Alter's five returning decisions corresponding to different possible amounts sent by Ego could also be analyzed separately, but preliminary analyses showed that the amount returned depends almost linearly on the amount received. Therefore, the use of the average proportion returned does not imply any loss of information.

Our main independent variable is the experimental condition representing the type of power relation experienced in the first phase. Other independent measures refer to the subjects' behavior during the negotiations in phase 1 of our experiment. We used individual earnings in the exchange as an individual measure for the success of the exchange relation. Since individual earnings are obviously strongly affected by the power position of the actor in the exchange relation we standardized this measure within power conditions. We realize this is a deviation from relational cohesion theory arguments but it has the additional advantage to make comparison across experimental conditions possible. Assuming that in negotiated exchanges prosocial types offer more points to their partner and individualistic types offer fewer points, we take the average amount offered by the actors during the negotiation phase as a measure of social preference. Since offers differ systematically between different types of exchange relations, also this measure is standardized within power conditions.[8]

At the end of the experiment, subjects fill in a short questionnaire in which we ask for some personal characteristics that we then use as control variables in our analyses: sex, age, and major. The questionnaire also included an 18 items trust scale. Some of the items are adopted from Yamagishi and Yamagishi (1994) and Wrightsmann (1974). Eight of the initial items were excluded after reliability analysis and the remaining 10 were entered in a factor analysis. Two factors were found and the standardized scores were used as trust indices. The first factor loads stronger on items referring to a preference for dealing with others with whom the respondent has a long-lasting relation. This factor can be compared to Yamagishi and Yamagishi's (1994, p. 151) "knowledge-based trust." The second factor represents a general positive and benign attitude and can be compared with Yamagishi and Yamagishi's (1994, p. 147) "general trust scale."

Our data have a multilevel structure, because observations are clustered within networks (or dyads). Therefore, all hypotheses are tested by means of linear regressions with robust (Huber) standard errors modified for clustering within networks (Huber, 1967; Rogers, 1993). Alternatively, one could estimate a multilevel model with random effects for the network level. However, we decided to present results obtained with linear regression models with robust estimation for three reasons. First, this model is actually more conservative than a multilevel model. It estimates standard errors taking into account that observations belonging to the same network are not independent, but it requires less strict assumptions about the sampling distributions, and we are not sure that the assumptions required by multilevel modeling would be met by our data. Second, we tried estimating a multilevel model anyway, and the random effect referring to the network level was estimated at zero. Third, the significance levels of all variables are slightly different using a multilevel model but the substantive message does not differ.

[8] We preferred not to use a standard measure of social orientation (i.e., Liebrand, 1984) because we feared that this could provide a specific frame thus influencing actors' subsequent decisions.

4. Results

4.1. Trust

Concerning the exchange phase of the experiment, actors in dyads settled on an equal split of the resources available to the exchange, whereas in the branch31 high power actors gained considerably more than low power actors, as predicted by network exchange theory. Table 1 presents four regression models on trust. Model 1 only includes the four variables representing four different power relations, This model tests the competing Hypotheses 0–1b. Model 2 adds the individual earnings from the exchange phase (referring to Hypotheses 2–5), the average amount offered by Ego in the bargaining process (Hypothesis 6), and the average amount offered by Alter in the bargaining process (Hypothesis 7). Model 3 presents the same variables included in model 2, but now controlling for personal characteristics of the subjects, namely sex and the two trust indices. Finally, model 4 includes also an interaction term between own earnings and a dummy variable which takes value 1 if the trust problem involves the same couple who previously had an exchange relation, and 0 if not. This term has been included in order to test whether the effect of individual earnings differs between those subjects who had previous exchange with each other and those who did not (i.e., LTL).

In model 1 the power relations are entered as dummies and our control group (strangers) is the reference category. Actors in equal power relations and high power actors display more trust than strangers, while low power actors do not differ significantly from strangers, regardless of who their partner is. Therefore, for equal power relations, Hypothesis 1b is supported and the null Hypothesis 0 can be rejected. Conversely, for relations between actors embedded in strong power networks, results differ depending on power position: for high power actors Hypothesis 1b is supported and Hypothesis 0 is rejected, while for low power actors neither Hypothesis 1a nor Hypothesis 1b is supported and the null Hypothesis 0 cannot be rejected. These results are robust and consistent in all four models. Conversely, we need to be more cautious when drawing conclusions on the remaining hypotheses. The significance levels of the variables referring to Hypotheses 2–7 are in fact somewhat instable across the four models and the effects of these variables are not always statistically significant. More specifically, the effect of individual earnings from the exchange is never significant. However, running the same analyses separately for the four groups referring to different power conditions we discovered that individual earnings have a positive effect for equal power, HTL, and LTH relations, but no effect for LTL relations. Thus, in model 4, we introduced an additional term in order to disentangle these two effects. We did this by adding an interaction between individual earnings and a dummy which takes value 1 if the subject plays the Investment Game with the same person with whom she had previous negotiated exchanges and 0 otherwise. Therefore, in model 4, the coefficient of the main effect of individual earnings represents now this effect for actors in the LTL power relation, whereas the interaction term indicates how this effect differs for the subjects who played the Investment Game with a subject with whom they had negotiated exchanges.[9] Thus, model 4 shows that the effect of individual earnings differs significantly depending on whether a subject played the Investment Game with the same subject with whom he or she had previous exchanges. This effect is actually positive and significant ($p = 0.005$, one-sided) for subjects who played with the same partner with whom they

[9] The coefficient of the main effect of "individual earnings" in model 4 represents the effects for LTL because the earnings of strangers are obviously 0 since they did not have negotiated exchanges before the Investment Game.

Table 2
Linear regression model on trustworthiness (144 subject, 54 networks)

Hypotheses	Independent variables	Expected sign	Coeff. (standard error)		
			Model 1	Model 2	Model 3
H0–H1a–H1b	Equal	0 − +	−0.00 (0.042)	−0.01 (0.042)	−0.05 (0.046)
H0–H1a–H1b	HTL	0 − +	0.05 (0.036)	−0.05 (0.036)	0.00 (0.040)
H0–H1a–H1b	LTH	0 − +	−0.04 (0.071)	−0.04 (0.074)	−0.05 (0.055)
H0–H1a–H1b	LTL	0 − +	−0.05 (0.045)	−0.04 (0.045)	−0.06 (0.041)
H2–H3–H4–H5	Individual earnings	+		0.02 (0.019)	0.01 (0.017)
H7	Average offer by Alter	+		0.00 (0.023)	−0.01 (0.021)
	Amount sent				0.05*** (0.014)
	Sex (female = 1)				0.07* (0.038)
	Trust (knowledge-based)				0.00 (0.018)
	Trust (general)				0.03* (0.018)
	Constant		0.35*** (0.029)	0.35*** (0.029)	0.20*** (0.052)
R^2			0.023	0.031	0.194

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$ two-sided significance based on Huber standard errors modified for clustering within networks.

had previous exchanges (i.e., equal power, HTL, and LTH), and negative and not significant for the others. This implies that Hypotheses 2–4 are supported, while Hypothesis 5 is not supported. Concerning Hypotheses 6 and 7, our analyses provide some evidence supporting the predicted effects of individual social orientations. However, the statistical evidence supporting Hypotheses 6 and 7 is weak and somewhat unstable across models, the p values for these two variables are slightly above or slightly below 0.05 one-sided, depending on which other variables are included in the model.[10] The instability of these effects could be due to the fact that our population is rather small, or perhaps our experimental design did not provide us with enough variation on the relevant variables to be able to perform a strong test of these hypotheses. Finally, in models 3 and 4, we found no difference in amount sent between men and women, and some significant effects of the two trust indices: actors who score higher on these two indices are sending slightly more.

4.2. Trustworthiness

Table 2 displays three linear regression models on average percentage returned. In this case we present three models. Unlike our previous analysis on trust, these models show that only some of the control variables included in model 3 have significant effects on trustworthiness. The experimental manipulations, individual earnings, and the other variables representing the behavior of subjects during the bargaining phase, have no significant effect on trustworthiness.

In model 1, none of the effects of the power relations is significant, thus for the effects of repeated exchanges on trustworthiness the null Hypothesis 0 cannot be rejected and neither Hypothesis 1a nor Hypothesis 1b is supported: repeated exchanges do not increase or decrease trustworthy behavior under any power condition. Interestingly, however, high power actors seem

[10] In model 4, the effect of the average offer by Alter drops because this variable correlates with the interaction term, individual earnings for subjects playing with the same partner. Therefore, in model 4, we cannot distinguish the effects of own earnings from the effects of offers sent by Alter.

to return on average slightly more than actors embedded in any other type of power relations. In particular, focusing on branch31 networks, the difference in trustworthy behavior between high power and low power actors is statistically significant ($t = -1.73$, $p = 0.04$). Thus, high power actors are both more trusting and more trustworthy than low power actors.[11] This result implies that power differences damage trust relations because high power actors tend to be overconfident and run the risk of being exploited, whereas low power actors might lose good opportunities by being excessively distrustful.

Looking at personal characteristics, the average proportion returned increases especially with the amount sent. Note that, since every subject played the Investment Game twice, first as Ego and then as Alter, "amount sent" does not indicate the amount received by the actor in the position of Alter, but the amount sent by the same actor when playing as Ego in the first Investment Game. Thus, the positive effect of "amount sent" in these models means that subjects who send more also return more. Furthermore, women return slightly more than men and attitudinal trust, as measured by our general trust scale, increases slightly the amount returned, while the second trust index, knowledge-based trust, has no significant effect on the amount returned. These results are comparable with Glaeser et al. (2000) who found that attitudinal trust, as measured by the GSS questionnaire, predicts trustworthiness better than trusting behavior.

In preliminary analyses, we found that the amount returned depends linearly on the amount received. Therefore, in our study it appears that the use of strategy method (Selten, 1967) does not yield additional insights. Moreover, although other studies indicated that the strategy method does not alter subjects' choices (Brandts and Charness, 2000; Cason and Mui, 1998), it is possible that, in our study, this linear relation between amount received and amount returned prevented the observation of other effects related to the exchange. Analyzing an Investment Game played in both roles, Burks et al. (2003) found that playing both roles reduces the amount returned, possibly because actors perceived a "reduced responsibility" for inequalities in the outcomes. Thus, in our experiment, returning decisions were possibly influenced both by "reduced responsibility", due to the fact that actors played both roles, and by a linear relation with the amount received presumably induced by the use of strategy method. In other words, our subjects based their five returning decisions almost solely on the five corresponding amount received.

5. Conclusion

In this paper we study the effects of power in negotiated exchanges on the development of interpersonal trust. We devised a specific experiment in which actors first experience a phase of negotiated exchange within given exchange relations and subsequently play an Investment Game with one of their exchange partners, first in the role of Ego and then in the role of Alter. The Investment Game provides a behavioral measure of trusting as well as trustworthy behavior. We compared levels of trust and trustworthiness among actors exchanging in an equal power relation and in a branch31 with the behavior of two strangers with no experience of previous exchanges. We presented a set of hypotheses based on the literature on commitment and affection

[11] The fact that high power actors both sent more and returned more in the Investment Game might also suggest that these actors are simply more generous rather than more trusting and trustworthy. Particularly, this explanation holds if we assume that actors who earn more in the exchange phase perceive this as unfair with respect to low power actors who were typically exploited in negotiated exchanges. Given the available data, this explanation cannot be excluded, but such an hypothesis could be tested by running a new session of the experiment with an additional manipulation, for example, letting high power actors play a dictator game with low power actors after the negotiated exchanges.

in exchange relationships and on individual social preferences. On the one hand, results show that repeated negotiated exchanges in equal power relations increase trust. Within relations between actors embedded in strong power networks, high power actors display a higher level of trust than strangers, whereas the trusting behavior of low power actors does not differ from the behavior of perfect strangers. On the other hand, repeated negotiated exchanges do not affect trustworthy behavior. Trustworthy behavior seems in fact to depend more on personal characteristics than on what happened in the exchange phase. Comparing predictions stemming from different theories, we found some evidence for relational cohesion theory as well as for the effects of individual social preferences. There is some indication that subjects learn about their partners observing how they bargain, and that they also are influenced by their own social preferences, but the statistical evidence for these effects is rather weak. Interestingly, individual earnings affect subsequent trusting behavior only if they can be related to the behavior of the partner.

Our results imply that successful exchanges in equal power or high power positions promote trust, but this trust seems to be unjustified because actors in equal power or low power position do not become more trustworthy towards their partners. Conversely, low power actors are just as trusting as strangers, both when they are matched with another low power actor and when they are matched with a high power actor. However, in the latter case they could be more trusting instead, because high power actors are more trustworthy than low power actors.

In this paper the relation between negotiation in repeated exchanges and trust is investigated adopting a behavioral rather than attitudinal measure for trust as well as trustworthiness. The results call for more research into this area. In particular, more theoretical work is needed to understand what micro-mechanism produces the differences in trust levels that we observed. Existing theories stress the role of emotions but focus on the dyad as a unit of analysis. Trusting decisions are intrinsically individual, thus a theory of trust in exchange relations should address how actors assess their partner's trustworthiness from the information they obtain negotiating with her. The results presented here suggest that backward-looking rationality and heterogeneous actors could be important elements of such a theory. Finally, although most theories claim that trust depends on the expectations subjects have with respect to the motives of the trusted actor, i.e., her trustworthiness, sociological research has been disproportionately devoted to study trust. The difficulty encountered here in predicting trustworthy behavior shows that trustworthiness should be placed much higher on our research agenda.

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