DFG Research Group 2104
Need-Based Justice and Distribution Procedures

Need-based Justice in Social Exchange Networks

Bernhard Kittel, Sabine Neuhofer and Manuel Schwaninger

Working Paper Nr. 2017-04

http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-04.pdf

Date: 2017-04-12

DFG Research Group 2104 at Helmut Schmidt University Hamburg
http://needs-based-justice.hsu-hh.de

Need-based Justice in Social Exchange Networks

Bernhard Kittel,* Sabine Neuhofer, and Manuel Schwaninger

12. April 2017

* Corresponding author: bernhard.kittel@univie.ac.at

Abstract: We examine experimentally whether heterogeneous needs affect the distribution of outcomes in small and negatively connected exchange networks. We operationalize an individual need as a threshold of points an actor has to obtain in a negotiation in order to earn additional income in a subsequent real effort task. In contrast to previous exchange network experiments, an offer is not restricted to the negotiating dyad but can allocate the endowment to all network members. Contrary to the standard rational choice assumption, our results show that the majority of accepted offers fulfill the needs of all actors in the network. Moreover, the network structure, the ranking of needs, as well as the interaction of these factors, significantly affect the distribution of resources in the network.

Keywords: Need-based justice, negotiated exchange, laboratory experiment

Acknowledgments: This paper is based on project B1 "Need-based justice and distributive preferences in social exchange networks", which is part of the research group FOR2014 "Need-based justice and distribution procedures", (http://bedarfsgerechtigkeit.hsu-hh.de/). We gratefully acknowledge funding by the Deutsche Forschungsgemeinschaft (DFG, KI 1419/2-1) and the Austrian Wissenschaftsfonds (FWF, I888-G11).

1 Introduction

The acquisition of the means to secure basic needs for survival overrides any other human motivation, and depriving someone of these means is usually considered a major element of injustice (Lindenberg 2013). The distributive principle of need may indeed be the common denominator between otherwise very different societies or political systems. To account for possible differences between individuals and cultures, Nussbaum (2000, 2011) has introduced the concept of *thresholds* for a set of human "functionings" that are required for a dignified life: "(A)ll should get above a certain threshold level of combined capability, in the sense not of coerced functioning but of substantial freedom to choose and act" (Nussbaum 2011, 24). Within a society consensus must be formed about what is recognized as a need and whether and to what extent it should be realized.

Miller (1999, 210) suggests identifying needs that transcend the biological minimum "by reference to social norms" that evoke "a shared conception of the range of activities that together make up a normal human life," or, put otherwise, a "minimally decent life." However, the identification and social acceptance of basic needs is neither theoretically nor empirically straightforward. It varies with the natural and social environment of the society, implying that the only possible criterion for the evaluation of needs is that "members of the society have agreed that it should count" (Miller 1999, 225). Moreover, referring to the satisfaction of needs as a principle of justice requires that all members of the society can trust that they will receive the agreed-upon allocations in times of hardship, which depends on the mutuality of assurance (Bowles and Gintis 2000, 37).

Given the diversity of humans, individual needs are necessarily heterogeneous within a society (Doyal and Gough 1991). This property of needs implies that allocations based on the principle of need-based justice cannot refer to some universalistic algorithm, such as equity or equality, but must put forward the particularistic criterion of the subjective difference between "is" and "ought" (Jasso, Törnblom, and Sabbagh 2016). According to studies of hypothetical allocative decisions, individual needs are typically taken into account (Gaertner and Schokkaert 2012). But the recognition of an individual need by others is only one step and does not guarantee its actual realization (Jasso 2015).

In situations in which resources are scarce and the sum of the need thresholds exceeds the available amount of the resource, justice according to the need principle cannot be fully achieved. Hence, in order to test the relative importance of need compared to alternative principles of justice, such as equity, equality or efficiency, we study situations

of abundance. But if all needs are satisfied and there is still leftover of the resource, other distributive principles or motives are to be used in addition to need satisfaction. Thus, "[o]nly an experiment in which equality and distribution according to need were presented as *alternatives* would give us decisive proof" (Miller 1999, 73).

Negotiated exchange is the most direct form of social exchange: At least two agents engage in direct negotiation about the distribution of a limited and fixed resource, whereby the gain of one implies a reduction of the share of the other.[1] Being a zero-sum game, therefore, negotiated exchange has a very high conflict potential, which makes it particularly interesting to study in combination with justice principles in general, and need claims in particular (Törnblom and Kazemi 2012).

Operationalizing the idea that the minimum number of agents for the emergence of societal structures is three (Simmel 1950), Yoon, Thye, and Lawler (2013) show that, compared to dyads, variability of behavior declines and cohesion increases in triads. In the present study, we build on these insights in order to compare adherence to the principle of need-based justice to other principles of justice as the motivation underlying individual behavior in social exchange networks of three nodes. Whereas equity, equality, and efficiency have been investigated extensively (Cook, Emerson, Gillmore, and Yamagishi 1983; Konow 2001; Liebig and Sauer 2016), needs seem to have been neglected (Cook, Cheshire, Rice, and Nakagawa 2013; Molm 2007; Neuhofer, Reindl, and Kittel 2015).

In negatively connected three-node networks, only one dyad can form and distribute the resource among themselves (Cook and Cheshire 2013; Molm 2014). Thus, assuming self-regarding utility maximization, theories and experiments on negotiated social exchange traditionally set the possible share of a third party to zero by design. However, if subjects hold other-regarding preferences, they may allocate points to all individuals in the network when negotiating in a dyad (Willer, Gladstone, and Berigan 2013). The study focuses on three structural conditions of need recognition: the distribution of individual needs, the sum of individual needs in a given network, and the structure of the network implying a specific distribution of power.

In order to examine the need principle in a social network of three agents we conduct a laboratory experiment and assign heterogeneous need thresholds to individuals. Our experiment is, firstly, designed to test whether the existence of needs affects the distribution of resources in negotiations. Secondly, we also test whether power differences implied by

[1] In this paper, we disregard other forms of social exchange such as reciprocal exchange, generalized exchange, and productive exchange (e.g., Lawler, Thye, and Yoon 2008).

the structure of the network influence the application of the need principle by examining the three-line network and the triangle. Our results suggest that the introduction of thresholds impacts on the usually observed distributions of negotiated outcomes, and that the structure of a network affects the probability that the need threshold of a specific position is satisfied.

The paper is organized as follows: In section 2, we situate our study in the framework of needs as threshold and discuss related theoretical literatures on structural power, social preferences, social distance, and social norms in order to contextualize and motivate the experiment. In particular, we will discuss three potential sources of variation in the extent to which needs are recognized: group-specific norms, social distance, and structural power. In section 3, we elaborate on the hypotheses and expectations and in section 4, we describe the experimental design. In section 5, we present our findings and we discuss them in section 6.

2 The Recognition of Needs in Social Exchange Networks

Exchange-theoretical discussions of individual behavior traditionally assumed that decisions are based on the assumption of self-regarding preferences. This also holds for expectations about distributive outcomes derived from the network structure (Lovaglia, Skvoretz, Willer, and Markovsky 1995; Cook and Cheshire 2013, 188; Molm 2014). In social exchange two or more agents hold resources which others value and seek to obtain (Blau 1964, 88). In negotiated exchange, distributions are proposed sequentially until an agreement is reached. The resource is limited, thus the gain of one unit of the resource implies the loss of one unit by the negotiating partner. Structural conditions, such as the form of the network and the position of an individual in the network, influence the distribution of negotiated outcomes by generating power asymmetries between the nodes of a network. In the following, we first explain our approach to need thresholds. We then elaborate on expectations from the basic conception and amend it by social preferences, social distance, and social norms.

2.1 Need Thresholds

We conceptualize needs as thresholds in a narrow interpretation of the capability approach (Sen 1985; Nussbaum 2011), which is easily amenable to laboratory experimental analysis

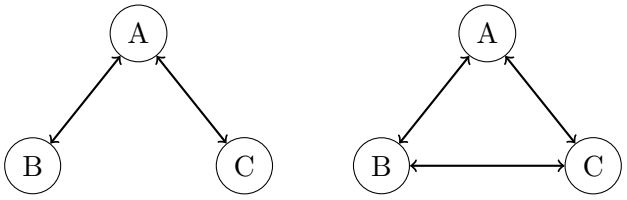
by focusing on the minimum allocation that is necessary for survival in the game. Subjects have to overcome exogenous heterogeneous thresholds to obtain a chance to realize additional income in a subsequent phase of the experiment. In dyadic negotiations, subjects endogenously determine the distribution of the resource between all three members of the network, which may or may not take need thresholds into account.

By implementing needs as individual thresholds in a network context, we deviate from earlier, economic, experiments on need-based justice (e.g., Cappelen, Moene, Sørensen, and Tungodden 2013) in two ways. First, needs have been studied in dictator games in which donors are informed about the financial status of the recipients. In contrast, in line with the conception of needs as a requirement for survival, needs do not refer to a property external to the game, but are an integral part. Second, in order to study the normative character of principles of justice, the recognition of needs is negotiated between two players in the presence of a third who can neither observe intermediate proposals nor veto the conclusion of an agreement.

2.2 Power

Of all networks that can be generated by considering three nodes, two represent particularly interesting social constellations with contrasting expected outcomes (Figure 1). The three-line structure connects one node with two other nodes that are not connected to each other. The central node—the broker—obtains structural power in dyadic negotiations because this agent has two possible exchange partners, while the others compete for exchange with this node. Such a network is characterized as a "power-imbalanced" structure and the central position is expected to negotiate a larger share of the resource by playing off the other nodes against each other. In contrast, if the two other nodes are also connected, the network forms a "power-balanced" triangle. Most studies in network-exchange theory assume that a network is negatively connected: Each agent can conclude only one agreement, which means that in a three-node network one agent is left out (Cook et al. 2013; Molm 2007; Neuhofer et al. 2015).

The complexity introduced by the provision that dyads emerge endogenously implies that all agents in the triangle can bilaterally negotiate with both other players, while only the broker can do so in the three-line network. In the network control bargaining (NCB) model (Braun and Gautschi 2006) the Nash bargaining solution is amended by a weight reflecting the power of a node due to the number and structure of its connections



(a) three-line (b) triangle

Figure 1: Three-node networks

to other nodes.

Assuming a negatively connected network, NCB predicts, first, that the available asset will be distributed between the two members of the dyad while the third node receives nothing, and, second, that the split between the members of the dyad will be $\{0.5, 0.5\}$ in the triangle and $\{0.83, 0.17\}$ in favor of the broker in the three-line network.[2] Thus, from a game-theoretic perspective, the assumption of self-regarding preferences rules out the consideration of third-person needs in networks. Furthermore, power-imbalanced structures put those who are in power in a position to appropriate a larger share of the available resource. We use these results as a reference for the subsequent elaboration of deviating expectations and as a baseline prediction for the experiment.

2.3 Social Preferences

The consideration of social preferences adds concerns for others' payoffs to the subjective utility function (Fehr and Gintis 2007). Given that the parameters of these factors must be determined empirically in order to derive exact model predictions, we discuss the implications of this amendment qualitatively with respect to the consideration of needs. Compared to the standard model, prosocial motives will shift distributive preferences away from one's own payoffs towards others' payoffs, while envy, which results from a feeling of injustice, will raise the priority of own payoffs (Tisserand, Cochard, and Le Gallo 2015). Envy thus works in the same direction as self-regarding preferences and will just harden the agent's insistence on her own payoffs in negotiations. Hence, the interesting motive is prosociality, which brings in the allocation of the third player.

In the triangle, prosocial preferences offer a potential way out of the endless cycle predicted by the chaos theorem (Frohlich and Oppenheimer 2007). Given equal structural

[2] These shares are calculated by using the formulae in Braun and Gautschi (2006, 10) with the appropriate weights given on page 12 of their paper.

power, the focal point for prosocials will be an equal split between all three players. In the three-line network, in turn, the allocations depend on the social preferences of the broker. A self-regarding broker will maximize her own share while prosocial motives will induce the broker to shift proposals towards the centroid. The relative shares of the other two players depend on the level of prosociality of the broker.

More demanding is a situation in which the need level of another player is higher than the amount allocated to each in the equal split. The justification of claims that go beyond the equal split on grounds of need attributes moral force to these claims. However, according to the conception that social preferences are negatively related to the level of inequality (Charness and Rabin 2002), the willingness to recognize the claims of another player should decline with increases in the share demanded.

2.4 Social Distance

Results from research on social exchange (Cook and Cheshire 2013; Neuhofer et al. 2015) suggest that "mutual dependencies are the underlying structural conditions for cohesion and solidarity in social units" (Lawler and Thye 1999, 235). Reciprocal relations and joint activity generate relational bonds between group members that foster prosocial behavior (Molm 2007; Thye, Lawler, and Yoon 2011; Kuwabara 2011). Dyadic negotiations in a three-node network, however, undercut potential nascent solidarity between all group members by driving a wedge between the negotiating dyad and the third person. The development of solidarity may thus be restricted to members of the dyad, who self-selected into this condition by engaging in more focused negotiations.

Consequently, the members of the dyad interact more frequently with each other than with the third person. Thus is the stage set for the condition identified by Simmel (1950, 97), who contrasted "personal relations, which are the very life principle of small groups, with the distance and coolness of objective and abstract norms without which the large group cannot exist." Experimental work in social psychology and behavioral economics, albeit typically focusing on the emotional—or affective—dimension, has shown that allocations to other players are negatively related to social distance (Lamm and Schwinger 1980; Hoffman, McCabe, and Smith 1996; Rankin 2006; Charness and Gneezy 2008). [3]

[3] These findings resonate with a related literature on the 'discontinuity effect' between individual and group decisions with respect to the relative weight of self- and other-regarding preferences in allocation decisions(Kugler, Kausel, and Kocher 2012).

Putting these observations together, we can expect agents to be torn between two motivations. On the one hand, the fact of jointly forming a group may foster solidarity among the three group members. However, on the other hand, social distance separates the dyad from the third person, thereby militating against the equal consideration of the needs of all three group members. The mere restriction of negotiation opportunities to dyads generates a difference in social distance between the group members and the joint activity of the members of the dyad increases the self-regarding thrust, or 'rationality', of the allocation decision.

2.5 Social Norms

Whereas social preferences and solidarity are intrinsic motivations in the sense of being formed by the individual, social norms are extrinsic to the individual. They are inter-individual in constituting shared and mutual expectations about each other's behavior (Hechter and Opp 2001). The infringement of norms is sanctioned by other group members by imposing costs on the perpetrator.

Principles of justice have the status of norms to the extent that they are regarded as binding in social relations in a particular society (Liebig and Sauer 2016). Given that all members expect each other to respect the prevailing principle in interactions, these principles become social facts (Durkheim 1982 [1985], 52). Distributive justice in negotiated exchange is typically conceptualized in terms of equity: "A man in an exchange relation with another will expect that the rewards of each man be proportional to his costs" (Homans 1961, 74). This conception implies that lacking a criterion for differentiation, the default justice norm is equality. Both principles are universalistic in scope.

Unlike equality and equity, which refer to an exogenous standard, the need principle is neither related to relative performance nor to a universal sharing norm. Needs are claims to some allocation that is necessary for survival, the size of which is unrelated to earlier effort and varies according to the heterogeneity of individuals (Sen 1973, 104).

Does the fact that one individual is "in need" of a specific fraction of the resource influence distributive outcomes in classical social exchange situations? The assumption of narrow self-interest dictates that the distribution of profits will not be influenced by the mere existence of needs, but by social preferences or a norm of need-based justice. Both, depending on the social distance between group members, could drive the distribution of

resources away from the usually observed pattern.

3 Hypotheses and Expectations

We use a laboratory experiment to study the separate and joint effects of justice norms, structural power, social preferences, and social distance on allocation decisions in three-node networks. Hypotheses 1 to 3 are concerned with the need principle in general, examining behavioral justice norms and social preferences. Hypotheses 4 to 7 relate more closely to conditions of structural power and examine the influence of social distance on the satisfaction of need thresholds.

3.1 Need-based justice

To what extent is a society willing to recognize a the fulfillment of a need as necessary for social functioning? We conceptualize this idea as the opportunity to "remain in the game", that is, to be able to generate income after the distribution of resources. If heterogeneous individual thresholds induce subjects to deviate from other distributive principles, such as selfishness and equality, we have evidence of the subjects' willingness to satisfy others' needs. The main hypothesis of our paper is:

H 1. *Exogenous need thresholds induce individuals to (a) offer and (b) accept offers that allocate points according to a need-based distribution.*

Further we must ask to what extent a society is willing to recognize a need as necessary for social functioning. If a need surpasses a given threshold in relation to the society's wealth it is unlikely that it will be socially accepted. Work on social preferences has consistently shown that allocations to others that are higher than allocations to oneself generate envy. Hence, while an outcome allocating a resource according to need levels is typically considered fair, the willingness to satisfy others' needs decreases with increasing personal sacrifices required to meet the others' needs (Konow 2003).

H 2. *The higher the threshold, the lower the probability that it will be fulfilled.*

The separation of the hypothetical preference for (or recognition of) a justice principle from the actual pursuit of a justice principle (and the corresponding distribution) is vital. The general support of an idea does not necessarily imply its actual support. Several studies show that the preferences for a tax can differ before and after the revelation of

the "veil of ignorance" (Rawls 1971), or simply, in different situations (Kittel, Paetzel, and Traub 2015; Traub, Seidl, and Schmidt 2009; Tyran and Sausgruber 2006). For example, a person may theoretically support the idea of high taxes for the rich in order to support the poor, but nevertheless evade the tax when finding herself wealthy.

We expect that the endorsement of the need principle on the individual level is in line with previous findings on distributive preferences (Konow 2001; Liebig, Sauer, and Hülle 2015). However, the individual is not solitary. We expect that knowledge about others' views on distributive principles influences the interaction within a given social aggregate. The justice principle prevailing in a group can thus be seen as an indication of a group norm. This norm is communicated to the group members after the ranking task.

H 3. *A group norm invoking the need principle in the network increases the probability of the actual fulfillment of needs in negotiated exchange.*

3.2 Needs in Network Structures

Most experiments on social exchange in networks set the share of a third party (that is, individuals excluded from the negotiating dyad) to zero by design. However, Willer et al. (2013) argue that this restriction limits the participants' scope of action, as some may have a preference for allocating some share of the resource to all members of the network. Previous research in other setups already bears evidence for preferences other than pure profit maximization (Au and Kwong 2004; Murphy and Ackermann 2014). The social distance between individuals can play an important role in this respect. People who interact with each other in negotiations, and who find an agreement, may feel closer to each other and, thus, may not feel any responsibility towards the excluded individual, who is not an active member.

H 4. *The probability of getting one's need threshold satisfied is larger in the agreeing dyad than outside the dyad.*

Hypothesis 2, which proposes that the need level is relative to the amount of available resources and the needs of the remaining individuals, should also apply for distributions including the third subject.

H 5. *The rate of satisfaction of the third party's need threshold is negatively related to the third party's threshold level.*

Social exchange networks allocate different negotiation power to individuals. We compare a network with equally distributed structural power to one with unequally distributed structural power. For the three-line network all social exchange theories predict a distribution favorable to the central position (Cook et al. 2013) and many experimental results reveal a skewed distribution favorable to the powerful individual (Neuhofer et al. 2015). Therefore, we expect that the broker's threshold will always be fulfilled.

H 6. *Subjects in structurally powerful positions are more likely to enforce the fulfillment of their own needs, compared to subjects holding structurally weak positions.*

However, if the more powerful subject displays a preference for the need principle, the outcome of the negotiation may result in a distribution that, on the one hand, satisfies the need threshold of the negotiation partner but, on the other hand, allocates all remaining points to the powerful agent herself. In this way, the need principle and selfish interests can be combined.

At the network level, the experimental design offers the possibility of comparing a structure that distributes power equally to an unequal structure. Equal structures engender equality of members (Stolte 1987). This joint understanding contributes to a higher probability of the recognition of needs in the power-balanced network. Similarly, an equal distribution of needs implies a homogeneous network structure and, hence, a more equal distribution of profits. Furthermore, individuals may feel closer to each other in the equal network, as in the unequal structure a power hierarchy may generate social distance through the positional hierarchy.

H 7. *The probability of the recognition of needs is higher in a balanced network than in an unbalanced network.*

4 Experimental Design

We operationalize the concept of thresholds as individual needs that are implemented by exogenously assigned and randomly allocated thresholds. The thresholds are common knowledge. A participant's allocation has to fulfill this threshold in order to earn additional income in a subsequent stage of the experiment.[4] The level, sum, and distribution of the

[4] Many previous experiments used a restricted information setting to keep fairness concerns from influencing the social exchange situation (e.g. Molm, Schaefer, and Collett 2009). In contrast, we

thresholds are based on theoretical predictions and considerations about justice principles (see below). This design allows us to test whether participants prefer to distribute equally, selfishly or according to needs. In order to study structural determinants of negotiation outcomes, we implement two three-node networks: (a) the triangle and (b) the three-line (see Figure 1).

4.1 Need Thresholds

We refer to different combinations of thresholds as *scenarios*. In all scenarios, 24 points have to be allocated among three players. The resource always exceeds the sum of needs in order to allow for the possibility of fully satisfying all needs.[5]

1. *Baseline (0-0-0).* This scenario without need thresholds serves as a point of reference for the introduction of needs.
2. *Equal needs (5-5-5).* An intermediate threshold of five points is suggested by the Network Control Bargaining (NCB) model (Braun and Gautschi 2006), which predicts a split of 20 points for the powerful and 4 points for one of the weak agents in the three-line network. A threshold of five is just above the predicted allocation of the weak agent. If the participants disregard the need thresholds, only one need threshold should be met in equilibrium. Note that in this scenario an equal distribution and the fulfillment of needs are congruent since needs are homogeneous. This case serves as a contrast to heterogeneous need structures.
3. *Unequal needs with one agent without needs (5-9-0).* As 24 points divided by three agents equals eight points for each agent, nine points is a rather high focal threshold because it just distorts an equal distribution of the total resource. In an equal three-way even split, one threshold is not met.
4. *Moderately unequal needs (1-5-9).* A low threshold of one point is predicted by several theories (Willer and Emanuelson 2008) to be the allocation for the weak subject in the three-line networks. If the subjects with the higher thresholds agree on an even two-way split, the threshold of the third subject is not met.
5. *Strongly unequal needs (1-5-12).* In the triangle the NCB Model predicts a split of twelve points for each agent in the agreeing dyad and zero for the third one. Hence, twelve is chosen as a high threshold.

provide all information necessary to form an opinion on the fairness of a distribution.

[5] In a world of scarcity, the need principle would in any case be violated.

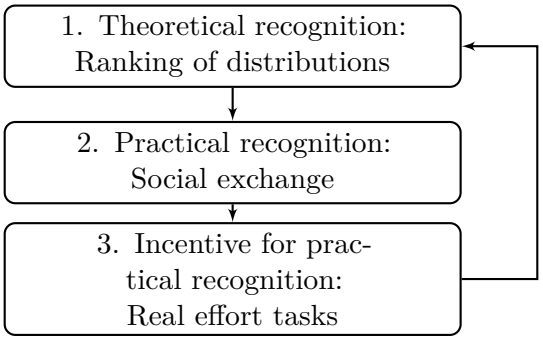


Figure 2: Flowchart of experimental procedure

The scenarios present different sums of needs, ranging from zero to 14, 15, and 18 points. So we can compare different sums of needs (such as 5-9-0 to 1-5-9), as well as equal sums with a different distribution of thresholds (5-5-5 to 1-5-9), homogeneous and heterogeneous ones. In addition, thresholds were iterated through the network positions in order to rule out location bias, on the one hand, and compare location effects, on the other hand.

4.2 The Experimental Procedure

Upon arrival in the laboratory, subjects were randomly seated in computer cubicles and given the instructions for the experiment.

The experiment consisted of three parts (see Figure 2) which were repeated seven times. Subjects were randomly assigned to networks of three in each period. Positions were graphically represented as red, green and blue dots in the picture shown to the subjects, and referred to as A, B and C.[6]

In the *first part*, subjects were confronted with six to ten (depending on the period's parameters) hypothetical allocation proposals of 24 points to be distributed between themselves and their two fellow network members (see Table 4.2 for exemplary list of possible distributions for one scenario of thresholds). Subjects were asked to rank those distributions according to their preferences, considering the need thresholds assigned to themselves and the others. Each distribution corresponds to a principle of distributive justice or a combination of principles (e.g., fulfilling the need thresholds of all and distributing the remaining points as equally as possible).

[6] See the Online Appendix for a screen shot of the displayed picture of the network.

Table 1: Hypothetical distributions for need thresholds of five, nine and one points

Thresholds	own	other 1	other 2
	5	9	1
Possible distributions			
Individualistic	24	0	0
Equal split	8	8	8
Needs + Individualistic*	14	9	1
Needs (1)*	8	9	7
Needs (2)*	7	9	8
Needs-Focal-Equal*	8	12	4
Unequal (1)	12	12	0
Unequal (2)	12	6	6
Unequal (3)*	6	12	6
Unequal (4)	0	12	12

Note: Distributions marked with a * fulfill the thresholds of all three network members

We identify the most popular aggregation rule in a network by means of a Borda count (Mueller 2003, 152-155).[7] Subsequent to the ranking, all subjects were informed about the "winning" distribution in their network. We name this message the "need signal". The procedure can be seen as a non-binding public norm-building process in the network aiming to separate the social recognition of needs from joint decisions about the distribution of points, which may or may not involve the consideration of needs.

In the *second part* subjects negotiated the distribution of 24 points. Subjects had one or two windows (depending on the treatment and the position within the network) in which they could privately send and receive numerical offers to and from connected subjects. As subjects were negatively connected, only one agreement could be concluded per period and network. Negotiations were restricted to dyads, but, contrary to common practice in network exchange experiments (Molm 2014; Neuhofer et al. 2015), the distribution proposals could also include the third subject. Negotiations were limited to three minutes. If the subjects did not agree after three minutes, nobody received any points. The negotiation screen displayed the network, the position and the need threshold of each individual. After agreeing on a distribution, subjects proceeded to the next screen informing them about the agreement and whether their allocated share was sufficient to

[7] The Borda count has the advantage of determining a unique winner more frequently than single preference votes.

fulfill their own need threshold. Subjects kept the earned points irrespective of the level of their need threshold.

In the *third part* subjects who had satisfied their threshold could earn additional income by completing real effort tasks.[8] Different tasks were used in order to restrain the formation of expectations. Subjects who did not earn a sufficient number of points also participated in the third part, but could not earn any additional points.[9] At the end of the period, each subject was informed individually about the points earned in this period.

In each of the seven periods, a different distribution of need thresholds was implemented and subjects were randomly allocated to a threshold and a position within the network. The networks only varied between experimental sub-groups. At the end of the experiment, one period was chosen randomly for the determination of payoffs. One practice period was implemented to familiarize the subjects with the experiment. Throughout all steps of the experiment subjects were completely informed about all aspects of the experimental procedure.

The experiment was programmed in z-Tree (Fischbacher 2007) and subject recruitment was administered by ORSEE (Greiner 2015). We conducted six sessions of 27 subjects each in January 2016, leading to a sample size of 162 students, who earned on average €36 in 2.5 hours.

5 Results

Firstly, we explore the justice attitudes that participants reveal by ranking different distributions. The remainder of the result section follows the order of our hypotheses. Secondly, we examine the recognition of need thresholds in general, and thirdly, we consider different thresholds and structural restrictions. We complete this section by showing the robustness of our findings using a logistical regression.

[8] The real effort tasks varied per round and included the following challenges: Adding and multiplying numbers, counting letters in a sentence, answering quiz questions, coloring points (Müller, Schwieren, and Spitzer 2016), and the slider task (Gill and Prowse 2011).

[9] We allowed participation in order to avoid boredom on the part of excluded subjects and the potential motivation to compensate for boredom in allocations.

Table 2: First places of hypothetical distributions according to Borda count on the individual and group level

	Individual level	Group level
Needs	0.39	0.62
(Needs + individualistic)	(0.19)	(0.35)
(Needs + equality)	(0.17)	(0.24)
(Needs + unequal)	(0.03)	(0.03)
Individualistic	0.32	0.14
Equality	0.17	0.12
Unequal + no needs	0.12	0.12

5.1 Justice Attitudes: Distributive Preferences

The first task in every round of the experiment was to rank several allocation proposals that were aggregated to form a group norm.[10] We do so to separate individual norm beliefs from behavior and to observe the impact of a network's endorsement of a justice principle.

Table 5.1 summarizes the results of the elicitation of preferences over distributions at the individual and group levels. It clearly shows that needs are the dominant principle at the group level. Figure 3 displays the specific distributions at the individual (left panel) and the network level (right panel) when need thresholds are heterogeneous. Homogeneous needs are not displayed in this graph, in order to disentangle equal distributions from need-based ones.

We discuss the findings for the most popular distributions: need, equality and individualism.[11] At the individual level *need-based distributions* made the first place in 39 percent of all cases. Aggregated at the network level the endorsement of need-based distributions is even stronger, as those distributions were often ranked second or third. In 62 percent of cases, a need-based distribution attained the first place in a network, and a need signal was communicated to the network. Given that we study situations of affluence, hybrid principles exist. The remaining points after considering needs can be distributed equally (the egalitarian-need based distribution – NB Egal.), or be appropri-

[10] This task was not incentivized by monetary payoffs. However, in only seven out of 1512 rankings participants ranked the distributions just in increasing or decreasing order as they were displayed.

[11] The choice of the network's aggregated first preference referred to a theoretically derived distribution in 84 percent of the cases.

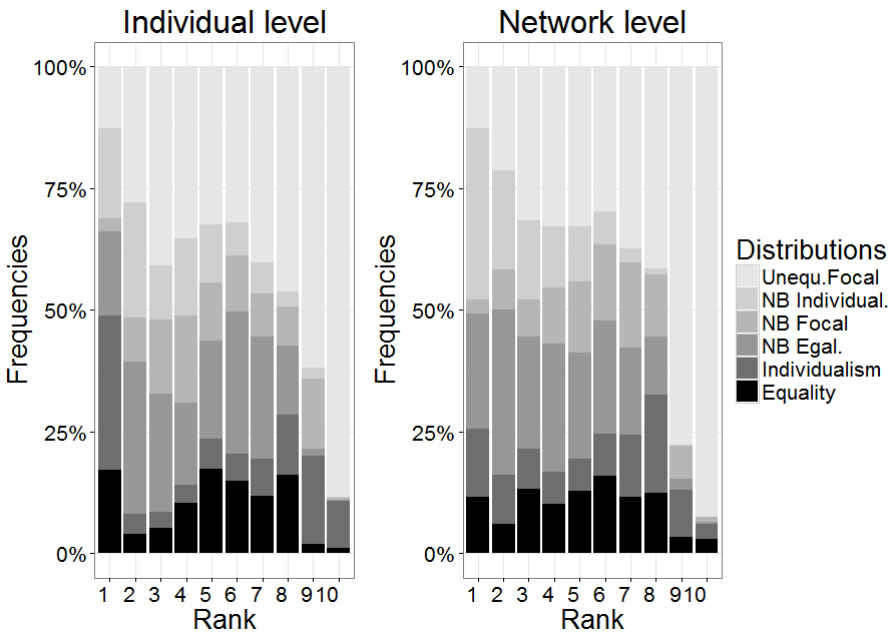


Figure 3: Frequency plot of the winning distribution at the individual (left) and network (right) level in the first part of the experiment. The network level is aggregated using the Borda algorithm. All labels including the abbreviation NB in any combination satisfy all three need thresholds.

ated by the proposer (the individualistic-need based distribution – NB Ind.).[12] Among the distributions favoring need, NB Ind. received the largest share of the votes on both the individual and the network level (19 and 35 percent, respectively), NB Egal. received 17 percent of the first places on the individual level and 24 percent on the group level.

The individualistic distribution attained the first place at the individual level in 32 percent and at the network level in 14 percent of the cases. Corresponding figures for the egalitarian distribution are 17 percent at the individual and 12 percent at the network level.

When needs are zero for all, subjects choose an egalitarian distribution in 47 percent, an individualistic one in 36 percent, and an unequal one in 17 percent of cases at the individual level. At the network level it is 47, 23, and 30 percent respectively. Thus, in the presence of need thresholds, individualistic and equal distributions matter less.

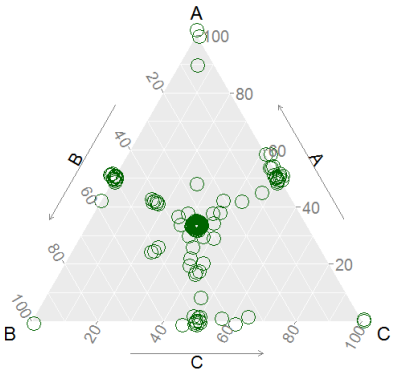
5.2 Need-based Justice in Distributions: Social Interaction

Do others' needs matter when an agent's own payoffs are at stake? Figure 4 highlights the effect of introducing thresholds for the triangle (top) and the three-line (bottom) networks. The left panels (Figures (a) and (c), respectively) show the outcomes of negotiations with thresholds of zero points. The right panels (Figures (b) and (d), respectively) show the distribution in the presence of need thresholds, being one, five, and nine points for subjects A, B, and C, respectively. The thresholds of all three subjects were satisfied in 89 percent in the triangle network and in 83 percent in the three-line network in total (difference significant; one-sided z-test, $p < 0.01$), thus supporting H 1, and also H 7.[13]

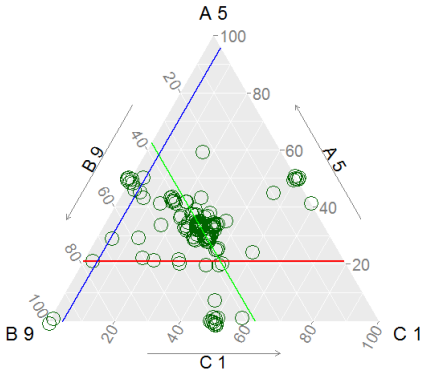
The graphs allow us to make several observations. Firstly, the triangle without need thresholds generates clear clusters at the equal splits between either two or three participants (a), whereby the three-way split appears to dominate (44 per cent). Introducing thresholds in panel (b) condenses distributive outcomes to the inner triangle generated by the thresholds, whereby the data clearly cluster along the line representing the highest need level for player B. Also noteworthy is the existence of outcomes that share equally within a dyad.

[12] The NB Egal. distribution covers all thresholds and aims to distribute additional points to low thresholds such that the final distribution is as equal as possible, whereas the INB allocates excess points to oneself. The third need-based distribution covers all thresholds and distributes excess points equally among the network but plays a minor role (ranked first in 3 percent of all cases).

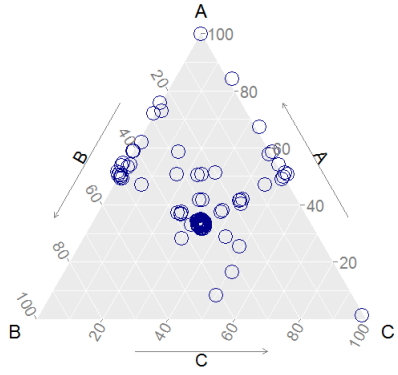
[13] See Online-Appendix A for a more detailed elaboration of the support of H 1



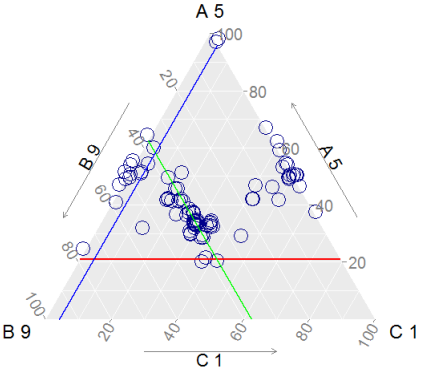
(a) Triangle network, no thresholds



(b) Triangle network, thresholds 5-9-1



(c) Three-line network, no thresholds



(d) Three-line network, thresholds 5-9-1

Figure 4: Accepted offers in the triangle (top) and three-line (bottom) network. Subjects are denoted with the letters A, B, C and the axes are labeled correspondingly. The three lines drawn in the right graphs mark the need threshold for each subject, which is also notated numerically next to the letter of the subject (i.e. B 9 has a threshold of nine points). Point indicators are jittered in order to avoid over-plotting.

Table 3: Rate of need satisfaction of all three network-members in the Triangle and the Three-line Network

		Thresholds	Position	Networks	
Scenario	Sum	Distribution	$A-B-C$	Triangle	Three-line
(1)	15	*moderately unequal*	$9-1-5$	.78	.53
(2)	15	*moderately unequal*	$5-9-1$	.56	.42
(3)	15	*moderately unequal*	$1-5-9$	.61	.36
(4)	15	*equal*	$5-5-5$	.78	.64
(5)	14	*unequal*	$5-9-0$	.67	.61
(6)	18	*strongly unequal*	$5-1-12$	.44	.25

Notes: The numbers in the fourth column denote the individual thresholds. The first number is the threshold of the broker position in the three-line network. Positions in the triangle network are homomorphically equivalent. Entries in the tables are shares of accepted offers.

Secondly, we observe a very similar pattern when comparing the lower two panels (c) and (d). Introducing need thresholds in the three-line network generates three clear clusters of outcomes: one on or near the highest threshold line and two on the line representing distributions only between the powerful player A and one of the two other players, both of which tend to be more favorable to player A. This suggests that this player successfully played off the other two against each other.

Thirdly, when comparing the two left panels (a) and (c), giving player A power by removing the communication channel between B and C, we observe that some players A use that power to pull the outcome closer to the self-interested maximum (which is point A). Nevertheless, a few players A agree on a distribution that allocates most of the points to the other two players. Most of the outcomes, however, are at or close to the centroid, suggesting that most players in the negotiating dyad more or less adhered to an egalitarian distributive norm.

Table 3 presents the share of networks distributing the points such that all three members' need levels are satisfied for the different threshold scenarios in the triangle and in the three-line condition. We contrast sums and distributions of thresholds by comparing the rows of the table. The upper panel varies the threshold of the A-player while holding the sum constant at 15 points. The lower panel holds constant the threshold of the A-player while varying the sum of the thresholds. The first row of this panel, which sums to 15 points, is used as a reference for the upper panel.

Note that in the triangle at least two network members always get their needs fulfilled.

In the three-line network only a very small fraction of outcomes does not satisfy at least two thresholds; therefore, and for the sake of simplicity, we only display frequencies for the fulfillment of all three network-members. Comparing unequal thresholds to the equal one (scenario 4), we find that the latter is significantly more likely to be recognized in almost all cases in the three-line (z-test, scenario 2: $p = 0.08$, scenario 3: $p = 0.03$, scenario 5: $p < 0.01$ scenario 6: p<0.01). In the triangle the difference is only significant in comparison to scenarios 5 (z-test; $p = 0.03$) and 6 (z-test; $p = 0.04$).

Turning to the lower panel, we find that in both networks a more unequal distribution of thresholds, as well as an overall increase of the thresholds, decreases the probability of need satisfaction and vice versa. The probability of the recognition of needs is higher in the triangle than in the three-line network, irrespective of the distribution of thresholds (z-test, $p < 0.01$).

In the three-line network, if the threshold of the high-power position is higher than the thresholds of the other network members, significantly more thresholds are fulfilled, compared to the case when the threshold of the powerful position is lowest, although the difference is not statistically significant (z-test, $p = 0.11$). Subjects in structurally powerful positions are more likely to enforce the fulfillment of their own needs, compared to subjects holding structurally weak positions; a finding that weakly supports H 6.

In conclusion, these observations show that the introduction of thresholds affects the distributions resulting from dyadic negotiations in that they are shifted away from other focal points towards meeting the exogenously imposed thresholds.

5.3 Needs, Exclusion, and Structural Inequalities

By design, one network member is always excluded from the conclusion of an agreement, but the agreeing dyad can distribute the resource between all three network-members. Comparing the two network structures we find that slightly more thresholds of excluded subjects were fulfilled in the triangle (24 percent) than in the three-line network (21 percent; difference significant, z-test, $p < 0.01$). The equality of the structure results in a more equal probability of recognition of thresholds even beyond the dyad, thus supporting H 7.

In both networks the frequency of fulfillment of the third (excluded) subject's threshold declines with increasing threshold levels, thus supporting H 5.[14] Compared to the

[14] In the triangle network excluded subjects get their threshold of 1, 5, 9, and 12 points fulfilled in 43, 37,

three-line, the fulfillment of higher thresholds occurs slightly more often in the triangle.

Focusing on the structural features of the positions of the networks we find that in the three-line network the threshold of the central position (A) is significantly more often fulfilled than those of the peripheral agents (z-test, $p < 0.01$ in both cases) and also compared to the equal positions of the triangle (z-test, $p < 0.01$). However, subjects in equal power positions are more likely to fulfill their thresholds than those in the weak position (z-test, $p < 0.01$). Again, these findings support H 6.

5.4 Conditions of Individual Need Satisfaction

To underline the robustness of our findings, we analyze logit models, using the fulfillment of the player's own threshold as the dependent variable (0=no, 1=yes).[15]

Table 4 displays two variants of the regression model. In *Model 1* we control for the player's own threshold level, the structural position in the network, and the period.[16] When we control for the other treatment variables, the probability of an individual's threshold satisfaction decreases significantly the larger the threshold level, thus supporting H 2. Compared to a threshold of one, a threshold of five reduces the likelihood of satisfaction by half, whereas a threshold of 12 is ten times less likely to be met. Furthermore, the threshold of the powerful position in the three-line network is almost five times more often satisfied than the threshold of the balanced position in the triangle network. Vice versa, the peripheral position has a negative influence and reduces the probability of satisfaction by half, compared to the balanced position, also supporting H 6.

In *Model 2* we add a variable indicating whether the individual was part of the agreeing dyad or not, and a variable indicating whether the need principle was ranked first and consequently signalled the social norm of a need-based distribution within a network. In

17, and 3 percent of the cases, respectively. Z-tests on the differences between 1 and 5 ($p = 0.03$) and 5 and 9 ($p = 0.02$) are significant. In the three-line network excluded subjects get their threshold of 1, 5, 9, and 12 points fulfilled in 47, 36, 14, and 3 percent of the cases. Again, z-tests on the differences between 1 and 5 ($p = 0.02$), and 5 and 9 ($p = 0.02$) are significant.

[15] We tested for the appropriateness of multilevel models given that we have 24 independent groups of 9 individuals. However, the ICC is low (0.06) and there is also no visible intra-class correlation when plotting the outcome on group level against the periods.

[16] The thresholds are coded dichotomously for each scenario. The threshold of zero points is excluded in these models, because it is fulfilled by definition. Each of the three distinct power positions are coded binary, and simultaneously represent the form of the network, as the powerful and peripheral positions only occur in the three-line network, whereas the balanced position only occurs in the triangle network.

the scenario with homogeneous need thresholds the equal and need-based distributions overlap. Therefore, these cases are omitted from this regression. Being part of the dyad has a highly significant and positive effect, thus supporting H 4: an active part of the agreement is 41 times more likely having a satisfied threshold. The addition of this variable also has the effect that the coefficient of the powerful position is no longer significant. This is, however, due to the fact that in all but one of the cases the powerful position was part of the dyad. The need signal has a significant positive influence on the probability of need satisfaction, thus supporting H 3. In fact, when a need-based norm is signalled in the network, the probability of threshold satisfaction is twice as likely.

To illustrate the impact of the need signal and the exclusion from the dyad consider the following cases: An individual with a threshold of 9 points, who held the peripheral position in the three-line network, and was excluded from the dyad has a predicted probability of .13 when no need signal occurred, and of .22 when it occurred. When the same individual was included in the agreeing dyad, the predicted probability of need satisfaction rises to .86 without signal, to .93 with signal. In contrast, holding all characteristics except the network position constant, a powerful subject (always included in the dyad) has a predicted probability of need satisfaction of .86 without need signal and of .92 when the need signal occurred. The lowest predicted probability of .059 can be found for a peripheral subject, with a threshold of 12, who was excluded from the dyad and the group did not endorse the norm of need satisfaction. So we see that an exclusion from the agreeing dyad has a detrimental effect on need satisfaction, but that the occurrence of a need signal enhances the predicted probability of need satisfaction.

6 Conclusion

We examined the recognition of the need principle in social exchange networks. While it is difficult to disentangle different justice concerns and preferences in most natural environments, an experiment provides a controlled environment that allows researchers to isolate causal effects of self-interest, the relative size of the need, and the structural power of the player on the probability that needs are met. We operationalized needs as randomly assigned thresholds to be satisfied by participants in order to earn additional profits in a subsequent task. To our knowledge, this design is the first to examine whether the need principle has a significant influence on negotiated distributions.

Our results show that individuals do indeed offer and accept distributions allocating

points according to a need-based distribution (H 1), and that the higher the threshold the lower the probability that it will be fulfilled (H 2). As expected, we find that the probability of recognizing the need threshold is larger within the agreeing dyad, compared to a third party outside the dyad (H 4) and, correspondingly, that the rate of recognition of the third party's need threshold depends on its level (H 5). The endorsement of the need principle at the network level has a positive effect on the actual fulfillment of individual thresholds (H 3).

Turning to the structure of the networks we find that subjects in powerful positions are more likely to get their needs fulfilled, compared to subjects holding structurally weak positions (H 6) and that the probability of the recognition of needs is higher in a balanced than in an unbalanced network (H 7).

Our core finding is that the need principle is indeed relevant at the individual as well as the network level, implying that traditional studies in the network exchange tradition have ruled out an important motivation of behavior by design. In addition, we observe that the structure of a network influences the frequency of the recognition of needs and, as expected, we find an interaction between structural power and the threshold level.

Our study thus confirms the importance of the power differentials imposed by the network structure. But, in addition, our study suggests that three further factors should receive more attention in the analysis of distributive outcomes in networks. First, we need to take into account subjects' social preferences, which may induce players not to use their structural power to maximize their own payoff, but to use it to increase others' payoffs. Second, even in a small network, the dyadic interaction structure may generate a differentiation in social distance between the members of the dyad and the "third person", resulting in a steep payoff gradient. Third, a norm prevalent in a certain group may constitute a focal point.

References

Au, W. T., and Kwong, J. Y. Y. (2004). "Measurements and Effects of Social-value Orientation in Social Dilemmas." In R. Suleiman, D. V. Budescu, I. Fischer, and D. M. Messick (Eds.), *Contemporary Psychological Research on Social Dilemmas* (pp. 71–98). Cambridge, UK: Cambridge University Press.

Blau, P. M. (1964). *Exchange and Power in Social Life.* New York: John Wiley & Sons Inc.

Bowles, S., and Gintis, H. (2000). "Reciprocity, Self-Interest, and the Welfare State." *Nordic Journal of Political Economy*, *26*, 33-53.

Braun, N., and Gautschi, T. (2006). "A Nash Bargaining Model for Simple Exchange Networks." *Social Networks*, *28*(1), 1–23.

Cappelen, A., Moene, K. O., Sørensen, E. Ø., and Tungodden, B. (2013). "Needs versus Entitlements. An International Fairness Experiment." *Journal of the European Economic Association*, *11*, 574-598.

Charness, G., and Gneezy, U. (2008). "What's a Name? Anonymity and Social Distance in Dictator and Ultimatum Games." *Journal of Economic Behavior and Organization*, *68*, 29-35.

Charness, G., and Rabin, M. (2002). "Understanding Social Preferences with Simple Tests." *The Quarterly Journal of Economics*, *117*(August), 817– 869.

Cook, K. S., and Cheshire, C. (2013). "Social Exchange, Power, and Inequality in Networks." In R. Wittek, T. A. B. Snijders, and V. Nee (Eds.), *The handbook of rational choice social research* (pp. 186–218). Stanford: Stanford University Press.

Cook, K. S., Cheshire, C., Rice, E. R. W., and Nakagawa, S. (2013). "Social Exchange Theory." In J. DeLamater and A. Ward (Eds.), *Handbook of Social Psychology* (pp. 53–76). Dordrecht: Springer.

Cook, K. S., Emerson, R. M., Gillmore, M. R., and Yamagishi, T. (1983). "The Distribution of Power in Exchange Networks: Theory and Experimental Results." *American Journal of Sociology*, *89*, 275–305.

Doyal, L., and Gough, I. (1991). *A Theory of Human Need*. Houndmills: Palgrave Macmillan.

Durkheim, E. (1982 [1985]). *The Rules of Sociological Method*. The Free Press.

Fehr, E., and Gintis, H. (2007). "Human Motivation and Social Cooperation: Experimental and Analytical Foundations." *Annual Review of Sociology*, *33*, 43–64.

Fischbacher, U. (2007). "z-Tree: Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics*, *10*(2), 171–178.

Frohlich, N., and Oppenheimer, J. A. (2007). "Justice Preferences and the Arrow Problem." *Journal of Theoretical Politics*, *19*, 363-390.

Gaertner, W., and Schokkaert, E. (2012). *Empirical Social Choice. Questionnaire-Experimental Studies on Distributive Justice*. Cambridge University Press.

Gill, D., and Prowse, V. (2011). "A Novel Computerized Real Effort Task Based on

Sliders." *IZA Discussion paper 5801*.

Greiner, B. (2015). "Subject Pool Recruitment Procedures: Organizing Experiments with ORSEE." *Journal of the Economic Science Association*, *1*, 114-125.

Hechter, M., and Opp, K.-D. (Eds.). (2001). *Social norms*. Russell Sage Foundation.

Hoffman, E., McCabe, K., and Smith, V. L. (1996). "Social Distance and Other-Regarding Behavior in Dictator Games." *American Economic Review*, *86*, 653-660.

Homans, G. C. (1961). *Social Behavior: Its Elementary Forms*. New York: Harcourt, Brace & World.

Jasso, G. (2015). "Thinking, Saying, Doing in the World of Distributive Justice." *Social Justice Research*, *28*(4), 435–478.

Jasso, G., Törnblom, K., and Sabbagh, C. (2016). "Distributive Justice." In C. Sabbagh and M. Schmitt (Eds.), *Handbook of Social Justice Theory and Research* (pp. 201–218). New York: Springer Science+Business Media.

Kittel, B., Paetzel, F., and Traub, S. (2015). "Competition, Income Distribution and the Middle Class: An Experimental Study." *Journal of Applied Mathematics*, 1-15.

Konow, J. (2001). "Fair and Square: The Four Sides of Distributive Justice." *Journal of Economic Behavior and Organization*, *46*(2), 137–164.

Konow, J. (2003). "Which Is the Fairest One of All? A Positive Analysis of Justice Theories." *Journal of Economic Literature*, *41*(4), 1188–1239.

Kugler, T., Kausel, E. E., and Kocher, M. G. (2012). "Are Groups More Rational Than Individuals? A Review of Interactive Decision Making in Groups." *WIRE Cognitive Sciences*, *3*, 471-482.

Kuwabara, K. (2011). "Cohesion, Cooperation, and the Value of Doing Things Together: How Economic Exchange Creates Relational Bonds." *American Sociological Review*, *76*(4), 560–580.

Lamm, H., and Schwinger, T. (1980). "Norms Concerning Distributive Justice: Are Needs Taken into Consideration in Allocation Decisions?" *Social Psychology Quarterly*, *4*, 425-429.

Lawler, E. J., and Thye, S. R. (1999). "Bringing Emotions into Social Exchange Theory." *Annual Review of Sociology*, *25*, 217-244.

Lawler, E. J., Thye, S. R., and Yoon, J. (2008). "Social Exchange and Micro Social Order." *American Sociological Review*, *73*, 519–542.

Liebig, S., and Sauer, C. (2016). "Sociology of Justice." In C. Sabbagh and M. Schmitt

(Eds.), *Handbook of social justice theory and research* (pp. 1–48). New York: Springer.

Liebig, S., Sauer, C., and Hülle, S. (2015). "Why is Justice Regarded as so Important? Theoretical Considerations and an Empirical Test of a Fundamental Question." *SFB 882 Working Paper Series*, *No. 46*, 1–25.

Lindenberg, S. (2013). "Social Rationality, Self-Regulation, and Well-Being: The Regulatory Significance of Needs, Goals, and the Self." In R. Wittek, T. A. Snijders, and V. Nee (Eds.), *Handbook of Rational Choice Social Research* (p. 72-112). Stanford Social Sciences.

Lovaglia, M. J., Skvoretz, J., Willer, D., and Markovsky, B. (1995). "Negotiated Exchanges in Social Networks." *Social Forces*, *74*(1), 123–155.

Miller, D. (1999). *Principles of Social Justice*. Cambridge: Harvard University Press.

Molm, L. D. (2007). "Experiments on Exchange Relations and Exchange Networks in Sociology." In M. Webster and J. Sell (Eds.), *Laboratory Experiments in the Social Sciences* (pp. 379–406). Elsevier Inc.

Molm, L. D. (2014). "Laboratory Experiments in the Social Sciences." In M. Webster and J. Sell (Eds.), (Second Edi ed., pp. 199–224). Elsevier Inc.

Molm, L. D., Schaefer, D. R., and Collett, J. L. (2009). "Fragile and Resilient Trust: Risk and Uncertainty in Negotiated and Reciprocal Exchange." *Sociological Theory*, *27*(1), 1–32.

Mueller, D. C. (Ed.). (2003). *Public choice iii*. Cambridge University Press.

Müller, J., Schwieren, C., and Spitzer, F. (2016). *What Drives Destruction? On the Malleability of Anti-social Behavior.* Unpublished working paper. University of Vienna.

Murphy, R. O., and Ackermann, K. A. (2014). "Social Value Orientation: Theoretical and Measurement Issues in the Study of Social Preferences." *Personality and Social Psychology Review*, *18*, 13–41.

Neuhofer, S., Reindl, I., and Kittel, B. (2015). "Social Exchange Networks: A Review of Experimental Studies." *Connections*, *35*(2), 34–51.

Nussbaum, M. (2000). *Women and Human Development. The Capabilities Approach*. Cambridge University Press.

Nussbaum, M. (2011). *Creating Capabilities. The Human Development Approach*. Belknap Press.

Rankin, F. W. (2006). "Requests and Social Distance in Dictator Games." *Journal of Economic Behavior and Organization*, *60*, 27-36.

Rawls, J. (1971). *A Theory of Justice.* Cambridge, MA: Belknap Press of Harvard University.

Sen, A. (1973). *On Economic Inequality.* Clarendon Press.

Sen, A. (1985). *Commodities and capabilities.* Amsterdam: North-Holland.

Simmel, G. (1950). *The Sociology of Georg Simmel. Translated, edited and with an introduction by Kurt H. Wolff.* The Free Press.

Stolte, J. F. (1987). "The Formation of Justice Norms." *American Sociological Review*, *52*(6), 774-784.

Thye, S. R., Lawler, E. J., and Yoon, J. (2011). "The Emergence of Embedded Relations and Group Formation in Networks of Competition." *Social Psychology Quarterly*, *74*, 387–413.

Tisserand, J.-C., Cochard, F., and Le Gallo, J. (2015). "Altruistic or Strategic Considerations: A Meta-Analysis on the Ultimatum and Dictator Games." *Manuscript, Université de Franche-Comté*.

Törnblom, K., and Kazemi, A. (2012). "Advances in Justice Conflict Conceptualization: A New Integrative Framework." In E. Kals and J. Maes (Eds.), *Justice and conflicts: Theoretical and empirical contributions* (pp. 21–51). Berlin: Springer.

Traub, S., Seidl, C., and Schmidt, U. (2009). "An Experimental Study on Individual Choice, Social Welfare, and Social Preferences." *European Economic Review*, *53*(4), 385–400.

Tyran, J. R., and Sausgruber, R. (2006). "A Little Fairness May Induce a Lot of Redistribution in Democracy." *European Economic Review*, *50*(2), 469–485.

Willer, D., and Emanuelson, P. (2008). "Testing Ten Theories." *The Journal of Mathematical Sociology*, *32*(3), 165–203.

Willer, D., Gladstone, E., and Berigan, N. (2013). "Social Values and Social Structure." *The Journal of Mathematical Sociology*, *37*, 113–130.

Yoon, J., Thye, S. R., and Lawler, E. J. (2013). "Exchange and Cohesion in Dyads and Triads: A test of Simmel's Hypothesis." *Social Science Research*, *42*, 1457-1466.

Table 4: Odds Ratios and Confidence Intervals (2.5%,97.5%) of Logistical Regression Models

	Dependent variable: Individual threshold fulfilled (yes=1)	
	Model (1)	Model (2)
Threshold (Ref. = 1)		
Threshold 5	0.54*	0.49**
	(0.31, 0.95)	(0.26, 0.89)
Threshold 9	0.26***	0.11***
	(0.15, 0.42)	(0.06, 0.20)
Threshold 12	0.11***	0.05***
	(0.06, 0.20)	(0.02, 0.11)
Power Position (Ref. = Balanced)		
Powerful	4.72***	0.58
	(2.03, 13.77)	(0.21, 1.89)
Peripheral	0.42***	0.57**
	(0.30, 0.61)	(0.36, 0.90)
Period	0.94***	0.89
	(0.86, 1.03)	(0.79, 1.00)
In Dyad		41.82***
		(23.22, 80.49)
Need Signal		1.96***
		(1.24, 3.12)
(Intercept)	21.20***	5.75***
	(10.92, 42.93)	(2.58, 13.41)
Observations	1,224	1,008
Log Likelihood	−449.711	−260.543
Akaike Inf. Crit.	913.422	539.086

Note: See Online-Appendix B for more details on the sample and Appendix C for regression coefficients

Table 1: Hypothetical distributions for need thresholds of five, nine and one points

Thresholds	own	other 1	other 2
	5	9	1
Possible distributions			
Individualistic	24	0	0
Equal split	8	8	8
Needs + Individualistic*	14	9	1
Needs (1)*	8	9	7
Needs (2)*	7	9	8
Needs-Focal-Equal*	8	12	4
Unequal (1)	12	12	0
Unequal (2)	12	6	6
Unequal (3)*	6	12	6
Unequal (4)	0	12	12

Note: Distributions marked with a * fulfill the thresholds of all three network members

Table 2: First places of hypothetical distributions according to Borda count on the individual and group level

	Individual level	Group level
Needs	0.39	0.62
(Needs + individualistic)	(0.19)	(0.35)
(Needs + equality)	(0.17)	(0.24)
(Needs + unequal)	(0.03)	(0.03)
Individualistic	0.32	0.14
Equality	0.17	0.12
Unequal + no needs	0.12	0.12

Table 3: Rate of need satisfaction of all three network-members in the Triangle and the Three-line Network

		Thresholds	Position	Networks	
Scenario	Sum	Distribution	$A-B-C$	Triangle	Three-line
(1)	15	*moderately unequal*	$9-1-5$	.78	.53
(2)	15	*moderately unequal*	$5-9-1$	.56	.42
(3)	15	*moderately unequal*	$1-5-9$	.61	.36
(4)	15	*equal*	$5-5-5$	.78	.64
(5)	14	*unequal*	$5-9-0$	.67	.61
(6)	18	*strongly unequal*	$5-1-12$	.44	.25

Notes: The numbers in the fourth column denote the individual thresholds. The first number is the threshold of the broker position in the three-line network. Positions in the triangle network are homomorphically equivalent. Entries in the tables are shares of accepted offers.

Table 4: Odds Ratios and Confidence Intervals (2.5%,97.5%) of Logistical Regression Models

	Dependent variable: Individual threshold fulfilled (yes=1)	
	Model (1)	Model (2)
Threshold (Ref. = 1)		
Threshold 5	0.54*	0.49**
	(0.31, 0.95)	(0.26, 0.89)
Threshold 9	0.26***	0.11***
	(0.15, 0.42)	(0.06, 0.20)
Threshold 12	0.11***	0.05***
	(0.06, 0.20)	(0.02, 0.11)
Power Position (Ref. = Balanced)		
Powerful	4.72***	0.58
	(2.03, 13.77)	(0.21, 1.89)
Peripheral	0.42***	0.57**
	(0.30, 0.61)	(0.36, 0.90)
Period	0.94***	0.89
	(0.86, 1.03)	(0.79, 1.00)
In Dyad		41.82***
		(23.22, 80.49)
Need Signal		1.96***
		(1.24, 3.12)
(Intercept)	21.20***	5.75***
	(10.92, 42.93)	(2.58, 13.41)
Observations	1,224	1,008
Log Likelihood	−449.711	−260.543
Akaike Inf. Crit.	913.422	539.086

Note: See Online-Appendix B for more details on the sample and Appendix C for regression coefficients

DFG Research Group 2104
– Latest Contributions

2017:

Schwaninger, Manuel, Neuhofer, Sabine and Kittel, Bernhard: Offers Beyond the Negotiating Dyad: Including the Excluded jn a Network Exchange Experiment. Working Paper Nr. 2017-05.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-05.pdf

Kittel, Bernhard, Neuhofer, Sabine and Schwaninger, Manuel: Need-based Justice in Social Exchange Networks. Working Paper Nr. 2017-04. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-04.pdf

Diederich, Adele and Wyszynski, Marc: Need, framing, and time constraints in risky decision making. Working Paper Nr. 2017-03. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-03.pdf

Kittel, Bernhard, Kanitsar, Georg and Traub, Stefan: Knowledge, Power, and Self-interest. Working Paper Nr. 2017-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-02.pdf

Traub, Stefan and Krügel, Jan Philipp: Risk Taking and the Welfare State: Some Experimental Evidence. Working Paper Nr. 2017-01. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-01.pdf

2016:

Guo, Lisa, Trueblood, Jennifer S. and Diederich, Adele: Thinking Fast Increases Framing Effects in Risky Decision-making. Working Paper Nr. 2016-04. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-04.pdf

Paetzel, Fabian and Sausgruber, Rupert: Entitlements and loyalty in groups: An experimental study. Working Paper Nr. 2016-03. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-03.pdf

Nicklisch, Andreas, Grechenig, Kristoffel and Thöni, Christian: Information-sensitive Leviathans. Working Paper Nr. 2016-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-02.pdf

Greiff, Matthias and Paetzel, Fabian: Less sensitive reputation spurs cooperation: An experiment on noisy reputation systems. Working Paper Nr. 2016-01.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-01.pdf

2015:

Schramme, Thomas: The metric and the threshold problem for theories of health justice: A comment on Venkatapuram. Working Paper Nr. 2015-05. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-05.pdf

Nicklisch, Andreas, Grechenig, Kristoffel and Thöni, Christian: Information-sensitive Leviathans – the emergence of centralized punishment. Working Paper Nr. 2015-04.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-04.pdf

Schramme, Thomas: Setting limits to public health efforts and the healthisation of society. Working Paper Nr. 2015-03. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-03.pdf

Hinz, Jana and Nicklisch, Andreas: Reciprocity Models revisited: Intention factors and reference values. Working Paper Nr. 2015-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-02.pdf

DFG Research Group 2104 at Helmut Schmidt University Hamburg
http://needs-based-justice.hsu-hh.de