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Need-Based Justice and Distribution Procedures

Meeting Needs. An Experimental Study on Need-Based Justice and Inequality

Tanja Pritzlaff-Scheele and Patricia Zauchner

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Meeting Needs. An Experimental Study on Need-Based Justice and Inequality

PD Dr. Tanja Pritzlaff-Scheele, University of Bremen (Germany)
Patricia Zauchner, MA, University of Bremen (Germany)

tanja.pritzlaff@uni-bremen.de
patricia.zauchner@uni-bremen.de

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Abstract

Do people agree to a distribution based on needs? Do arguments for or against a need-based distribution depend on the cause of an existing need? And if a need-based distribution is accepted, is need the single distribution principle that people take into account, or does need only come into play in combination with other principles, like entitlement/desert or equality? Based on data from laboratory group experiments, the paper analyzes the acceptance of need-based distribution and the relationship between need and other distribution principles. By analyzing the chat data from the group experiments, we take a closer look at the effects of group deliberation on decisions about resource distribution.

1. Introduction

Do people with different financial backgrounds try to meet the needs of the worst off when resources are distributed? And if they accept a distribution based on the principle of need, do they accept need as the single criterion that guides the distribution of resources, or is need only accepted in combination with other distribution principles? Furthermore, if people are willing to distribute resources according to need, is this a stable understanding of the way in which the distribution should be implemented, or does the acceptance of a need-based distribution change with changing background conditions?

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In the following paper, we analyze the acceptance of need-based distribution in varying contexts. Need as a criterion of distributive justice has been discussed for some time in social psychology, political theory and philosophy (see for example Deutsch 1975; 1985; Miller 1976, 1999; Doyal/Gough 1991; Hamilton 2003, 2016; Brock 1998, 2004). However, there are only few empirical studies on the actual acceptance of need-based distribution. Based on data from laboratory group experiments with a total of 365 participants, we study the acceptance of need-based distribution in a situation of unequal initial endowments, as well as the stability of the acceptance under varying conditions. However, first and foremost it is important to answer the question whether or not need does play a role in people's decisions on the distribution of resources under conditions of inequality, and how need is defined in those contexts.

According to David Miller, *need* as a principle of distribution can be understood in the way that "principles of need presuppose shared understandings of what someone must have in order to lead a minimally adequate human life" (Miller 1999: 19). And while it is certainly true that "the concept of need has many ambiguities" (Deutsch 1985: 43), it can be assumed, following Morton Deutsch, that "there are many situations in which it is not difficult to identify that some people have legitimate, urgent needs that are not being met while others do not" (ibid.: 44).

While Deutsch concludes that in these situations, "the application of the distributive value of need would not be problematic" (ibid.), there are in fact reasons to assume that this 'unproblematic' acceptance of the need principle is not to be assumed in every case and context in the same way. The willingness to accept a distribution principle like 'weaker first' (Savage/Torgler 2010: 242) might depend on the source or cause of the inequality among individuals; and it may also depend on the nature of the resources that are to be distributed. In the case of money, for example, our findings suggest that it does make a difference whether the resource that is going to be distributed consists of an extra amount of money, or whether people have to raise funds from their own resources first in order to redistribute the deposited amount afterwards.

However, the overall results from our experimental data show that if compared to other suggested distribution procedures, the acceptance of a need-based principle like 'weaker first' is significantly higher. In the following, the acceptance and rejection rates of different suggested distribution procedures, as well as written group deliberations on suggested distribution procedures, are analyzed in order to show if and how the acceptance of a distribution procedure is guided by the principle of need. The aim is to reveal whether the acceptance of a need-based distribution remains stable with changing background conditions, or whether the acceptance of need-based distribution varies in varying contexts. Based on a content analysis of written group deliberations

of the participants, we study whether or not need is accepted as the single criterion of distribution, or if it is combined with other distribution principles. In addition, we look at the overall effects of group deliberation on the distribution process, and on the effect that deliberation has on the acceptance of the need principle.

Our findings suggest that while a need-based distribution principle like 'weaker first' continues to have the highest acceptance rates across varying contexts – if compared to other suggested principles, like strict equality –, the acceptance of need-based distribution nevertheless decreases in treatments in which subjects redistribute a common fund of money deposited by the group members themselves (if compared to the distribution of an extra amount of money). This effect increases in those treatment conditions in which the unequal financial situation among group members is caused by a varying degree of performance in a preceding test (real effort).

Moreover, our findings from the text data show that *need* is only taken into account as a 'partial' criterion by the group members. Often times, the underlying principles or values referred to by the participants are argumentatively integrated into a 'mixed criterion' that includes, for example, aspects of need and aspects of equality. In those cases, a balance between the two aspects of need and equality seems to be more important to the participants than the mere fulfillment of needs.

However, there is a positive 'deliberation effect' in the case of need-based distribution in the sense that after deliberation, the acceptance of need is even higher, while the acceptance of other distribution procedures decreases after deliberation. Finally, our data shows that although, in the respective treatments, there is a tendency to reward a high performance in a preceding test – as well as a tendency to reward higher levels of contribution to a common fund in cases of redistribution –, need and equality remain the principles with the highest degree of acceptance. A mixed criterion based on equality and effort, although highlighted in some strands of the literature on need-based distribution (Frohlich/Oppenheimer 1992, 1990; Brock 2004), plays a comparatively small role in our findings.

2. Theoretical Background

Decision processes dealing with the acceptance of need-based distributions, as well as with the stability and continued support for a need-based distribution, have attracted only little attention in political science so far. However, a detailed discussion of actual need-based decision procedures can be found in the work of Norman Frohlich and Joe E. Oppenheimer, who studied dis-

tributive justice and distribution procedures experimentally. One of their main findings is that "the question of distributive justice involves competing claims of entitlements, need, and the desirability of preserving incentives" (Frohlich/Oppenheimer 1992: 176; see also Frohlich/-Oppenheimer 1990).

This finding hints at the fact that need is accepted as a criterion for distribution, but only as a partial criterion. Furthermore, this finding hints at a specific variant of a possible combination of need and other distribution principles, i.e. at a combination of need, entitlement and incentives.

Gillian Brock adapts the results presented by Frohlich and Oppenheimer in her theoretical work on cosmopolitan justice. She sums up the main findings presented by Frohlich and Oppenheimer in the following way:

> "So as we see then, needs matter in considering issues of justice, but even more important is the balance between needs, entitlements, and incentives. We seek a balance between these three considerations. […] As the empirical evidence shows, concern for the needy is strong and robust, all things considered. But importantly, it is strikingly not the case that under conditions of impartiality we want to arrange things so that we concern ourselves *only* with maximizing the position of the worst off." (Brock 2004: 178-179).

Frohlich, Oppenheimer and Brock conclude that *need* is an important criterion with regard to distributive justice, but need is not the single decisive principle or value. It comes into play only as a 'partial' criterion, i.e. if combined with aspects of entitlement and incentives. Following these findings, the acceptance of need as a criterion or principle depends on a functioning balance between these different criteria. In a similar vein, several studies in experimental economics support the idea of 'multi-criterion approaches', (Konow/Schwettmann 2016: see also Charness/Rabin 2002; Andreoni/Miller 2002) i.e. the idea that people's assumptions about distributive justice and about the fairness of resource allocations are often based on a combination of different criteria. Discussing distributive justice in the context of rewards in organizations, Joanne Martin and Joseph W. Harder refer to the same phenomenon as the use of "hybrid distribution rules" (Martin/Harder 1994: 243) and provide the following example:

> A "hybrid need-contribution rule for the distribution of new office furniture might begin with a determination of need (perhaps raising all employees' office furniture to a minimum threshold) and then further adjust the distribution on the basis of performance (perhaps giving special furniture to the highest performers). Utilization of such hybrid distribution rule might occur when dual goals of productivity and group

harmony coexist, as is the case in many organizational contexts […].” (ibid.: 243-244).

While there is evidence in the literature that suggests that need is accepted as a criterion for the distribution of resources, but only as a ‘partial criterion’ in combination with some kind of performance/effort-based distribution, there is also evidence that hints towards a second variant of a ‘mixed criterion’. This second variant suggests that need comes into play only as part of a criterion that combines elements of need and elements of equality. Researchers in social psychology, like Morton Deutsch, hint at the close relation between the values of need and equality. As Deutsch outlines:

> “‘Need’ and ‘equality’ as distributive values are closely linked and sometimes not distinguished. It is commonly assumed that individuals, equally, deserve basic human goods that are required to fulfill their fundamental needs; they do not have to earn them.” (Deutsch 1985: 43).

According to Kenneth A. Rasinski, citizens evaluate policies on the basis of fairness judgements that rely on two distinct values: proportionality and egalitarianism. While proportionality represents “social concerns about equity and economic individualism”, egalitarianism represents “social concerns about social equality and need” (Rasinski 1987: 202; see also Pratto/Tatar/-Conway-Lanz 1999). While citizens endorsing proportionality are “more likely to judge equity-based policies as fair”, citizens who endorse egalitarianism are “more likely to judge equality and need-based policies as fair” (Rasinski 1987: 209). In any case, fairness judgements are determined by “a variety of different value principles […] organized under two generic values, proportionality and egalitarianism” (ibid.: 210).[2]

In a similar vein, Nicholas Rescher hints at a close relation between need and equality. According to him, the principle of need can be characterized in the following way: “recognizing that as things stand, men come into the world with different possessions and opportunities as well as differences in natural endowments, the principle professes to treat them, not equally, but so as to *make* them as equal as possible” (Rescher 1966: 75).

[2] Morton Deutsch hints at the importance of context when it comes to distribution principles. According to him, “merit based on individual performance will be the dominant principle of distributive justice in situations where an economic orientation predominates; equality will be the dominant principle in situations where a solidarity orientation predominates; need will be dominant in caring-oriented groups or institutions” (Deutsch 1985: 216; see also Deutsch 1975: 143). According to David Miller, different principles of justice guide people in different contexts, i.e. there is a connection between principles of justice and modes of association (Miller 1999: 34). While need can be identified as the “substantive principle of justice” in “solidaristic communities” (ibid.: 27), like for example families or other small, face-to-face relationships, the relevant principle in instrumental associations is desert (ibid.: 28). For Miller, the third mode of association is citizenship, and the “primary distributive principle of citizenship association is equality” (ibid.: 30; see also Schramme 2017).

For our purposes, it is important to highlight that need as a criterion, value or principle in contexts of distributive justice is often closely linked to other values or criteria. In particular, two 'mixed criteria' can be identified: Following Frohlich, Oppenheimer and Brock, it can be assumed that a mixed need-effort-based criterion plays an important role when it comes to the acceptance of need-based distribution procedures. Following Deutsch, Rasinski and Rescher, it can be assumed that a mixed need-equality criterion determines decisions on the acceptance of need-based distributions. Resulting from these theoretical distinctions, the following hypothesis seems to be worth testing:

Hypothesis 1: Need is accepted as a distribution criterion, but only in combination with other principles.

A second important theoretical point refers to the stability of the acceptance of need-based distribution in varying contexts. First of all, there seems to be a difference between the acceptance of distribution criteria in cases of scarcity (undersupply) and the acceptance of distribution criteria in cases of 'abundant resources' (oversupply) (Greenberg 1981; see also Miller 1999: 204-205). Second of all, there seems to be a difference between the acceptance of distribution criteria in contexts in which a sum deposited by the respective society or group members themselves is *redistributed*, and the acceptance in contexts in which an extra amount is *distributed*, i.e. in cases of resource windfalls (Rescher 1966: 108-112). Finally, the acceptance of need-based distributions seems to vary due to differences when it comes to the "perceived cause of the need state" (Lamm/Schwinger 1980: 426). The underlying assumption about the role of the "perceived legitimacy of the particular need" is summed up by Lamm and Schwinger in the following way: "We hypothesize that people who are personally responsible for their distress will receive less help than people whose distress is caused by conditions outside of their control (ibid.; see also Berkowitz 1969). In their study, which specifically deals with the topic of *need*, Lamm and Schwinger come to the conclusion that in their own experiment with high school students, "the perceived causal locus of the need state had *no* effect on allocations" (Lamm/Schwinger 1980: 428). However, there are also findings to the contrary when it comes to the cause of existing inequalities in more general terms – which, in turn, may lead to different levels of need. While the respective studies on the causes of unequal financial starting positions do not explicitly refer to the category of need, they present evidence for differences in the willingness to redistribute – and in the perceived legitimacy of redistribution – in cases in which the unequal distribution of

income is based on luck, if compared to cases in which the unequal distribution is based on effort. As several studies show, these two cases lead to different levels of "deservingness" (Clark/D'Ambrosio 2015: 1166; see also Mollerstrom et al. 2015; Becker 2013).

In the Lamm and Schwinger experiment on need-based allocation, high school students were in need of different amounts of money. They needed the money in order to purchase textbooks to prepare for a written text. In one treatment condition, the needier person, i.e. the student who needed more money, needed the money because the respective books weren't available at the school library (external cause). In the second treatment condition, the needier student "had failed to reserve the necessary books early enough and the books were now out on loan" (internal cause) (Lamm/Schwinger 1980: 427). It may be assumed that in this particular case, the fact that the difference in the 'cause condition' had no effect on allocations may be the result of some kind of student solidarity. However, when it comes to the general causes for unequal distribution in experiments, evidence from various studies shows that "subjects tend to support more redistribution when initial earnings are 'arbitrary'" i.e. randomly assigned, "than when they are earned" (Durante et al. 2014: 1072).[3] In our study, it is assumed that it does make a difference whether the initial endowments are randomly assigned (lottery), or whether the initial endowments are the result of a preceding test (effort). This is especially the case in those situations in which the resource to be distributed is not an extra amount of money, but stems from a common fund which is created from proportional deposits – i.e. in cases in which the 'high performers' in a test (real effort task) have to contribute the highest amounts to a fund that is redistributed afterwards. This assumption can be summed up in the following hypothesis:

Hypothesis 2: In contexts of effort-dependent unequal distribution and/or redistribution, the acceptance of a need-based distribution decreases, while the acceptance of a effort-based distribution increases.

Finally, we assume that the level at which need is accepted as a distribution criterion does depend on the transparency of the decision procedure as well as the level of knowledge people have about existing needs and reasons presented in favor of a need-based distribution. Therefore, we study the effects of group deliberation on the acceptance of need as a distribution principle. It

[3] In a similar vein, Hoffman et al. 1994 found that in ultimatum and dictator games, "if the right to be the first mover is earned by scoring high on a general knowledge quiz, and that right is reinforced by the instructions as being earned, then first movers behave in a significantly more self-regarding manner" (Hoffman et al. 1994: 347).

may be assumed that if reasons for a need-based distribution are made transparent, and if people learn more about the actual needs of others, the acceptance rates are higher, if compared to a situation in which the knowledge about the existence of different levels of need remains at an abstract level. Therefore, the following hypothesis seems to be worth testing:

Hypothesis 3: The level of acceptance for a need-based distribution is higher in cases in which people deliberate on the reasons for the need-based distribution, i.e. in cases in which the reasons for the need-based distribution are made transparent.

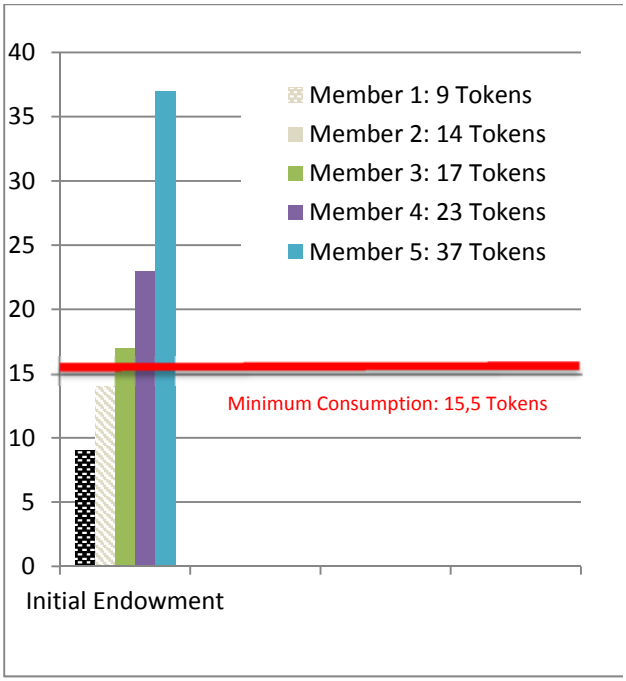
If people are confronted in an abstract way with the suggestion to distribute resources according to need, but don't know anything about the people in need, nor about possible reasons why one might want to support a need-based distribution, they might be reluctant to support a need-based distribution. But if they are able to participate in a deliberation process that makes arguments for or against different distribution principles more transparent, their support for a need-based distribution may grow.

3. Experimental Design

In an experimental economics lab, two series of experiments with a total of 365 participants were conducted.[4] In all of the treatments, participants were randomly assigned to groups of five participants. The overall task was to distribute a sum of 20 tokens among the five members of the group, who started the experiment with different amounts of tokens. Therefore, the starting position in all of the treatments was characterized by an unequal distribution of initial endowments among the five group members. The 'cause' for the unequal distribution, however, varied throughout the treatments: In one treatment condition, the financial starting position was randomly assigned (lottery), while in another treatment condition, it was based on effort, i.e. on the compensation for the achievements in a test which the group members had to complete at the beginning of the experiment (real effort). The initial endowments of the group members are displayed in Table 1.

[4] The experiments were conducted at the Wiso Experimental Lab at the University of Hamburg; https://www.wiso.uni-hamburg.de/en/forschung/forschungslabor/experimentallabor.html.
The experiments were conducted in July and November 2016. We would like to thank Olaf Bock and his team.

Table 1: Initial Endowments – Distribution Treatment (DIS)



Task:
Distribution of an additional amount of 20 Tokens
Suggested distribution procedures for members 1/2/3/4/5:
1. Equal distribution
4/4/4/4/4
2. Weaker first
11/6/3/0/0
3: Mixed principle
6.5/1.5/1/4/7
Or (in case the suggested procedure was not accepted):
Alternative distribution based on participant's suggestions

In all of the treatments, the group members had to decide on the distribution of 20 tokens in the context of a starting position in which 9 tokens were assigned to member 1, 14 tokens to member 2, 17 tokens to member 3, 23 tokens to member 4 and 37 tokens to member 5 (see table 1).
They were told that the distribution of the 20 tokens would be implemented in five consecutive rounds, and that – depending on their initial endowments – they would be able to save an amount of tokens over the course of the five rounds. There was, however, a minimum consumption rate of 90% in each round for all group members, and a maximum saving rate of 10 %. The minimum consumption rate per round was 15.5 tokens. It was not possible to avoid consumption. If the level of 15.5 tokens was not reached by a group member, the member ran into debt.

In a first series of experiments with 35 groups,[5] the task was to deliberate and decide on the distribution of an extra amount of money (20 tokens) between the five group members. Participants were told that if they accepted a suggested distribution procedure for the 20 tokens, this distribution procedure would become effective in five consecutive rounds. They were also told that in each round, there would be a minimal expenditure on living expenses that was fixed at 15.5 tokens. In case their income (initial endowment plus their share of the 20 tokens) was below the line of 15.5, they would run into debt. The participants were presented with a screen presentation

[5] The series was conducted with 36 groups. Due to technical difficulties in one of the groups, data was only collected in 35 groups (The omitted data stems from a group in the treatment combination Distribution/Effort/Weaker First).

that displayed the financial effects of the chosen distribution procedure. In three different versions of the experiment, **one** of the following three procedures was suggested to each group:

1) equal distribution (4/4/4/4/4)

2) weaker first (11/6/3/0/0)

3) mixed principle (6.5/1.5/1/4/7)[6]

In each group, two of the five group members (member 1 and member 2) started the deliberation process from a position below the line of minimum consumption, i.e. their initial endowments were below 15.5 tokens (see table 1). The fact that the initial endowments of two of the five group members were below 15.5 tokens meant that if they stayed at this level, they ran into debt during the five rounds in which tokens were distributed. Therefore, these two participants were 'in need' of extra tokens in order to stay out of debt.[7] Need was operationalized in the experimental design as minimum consumption or, respectively, as the consequence of running into debt.

In a second series, the mode changed from distribution (DIS) to redistribution (REDIS): Participants had to deposit a proportional sum from their initial endowments to a common fund that added up to 20 tokens, before deciding on the redistribution of this fund among the five group members. The redistribution experiment was run with 38 groups with five participants each.

Apart from the change from distribution to redistribution, this series of experiments did proceed in the same way as the distribution experiments: After the participants were informed about their initial endowments, each group was presented with one previously selected distribution procedure for the 20 tokens: either equal distribution (4/4/4/4/4), weaker first (11/6/3/0/0) or mixed principle (6.5/1.5/1/4/7). A screen presentation demonstrated the effects of the suggested distribution procedure after five rounds.

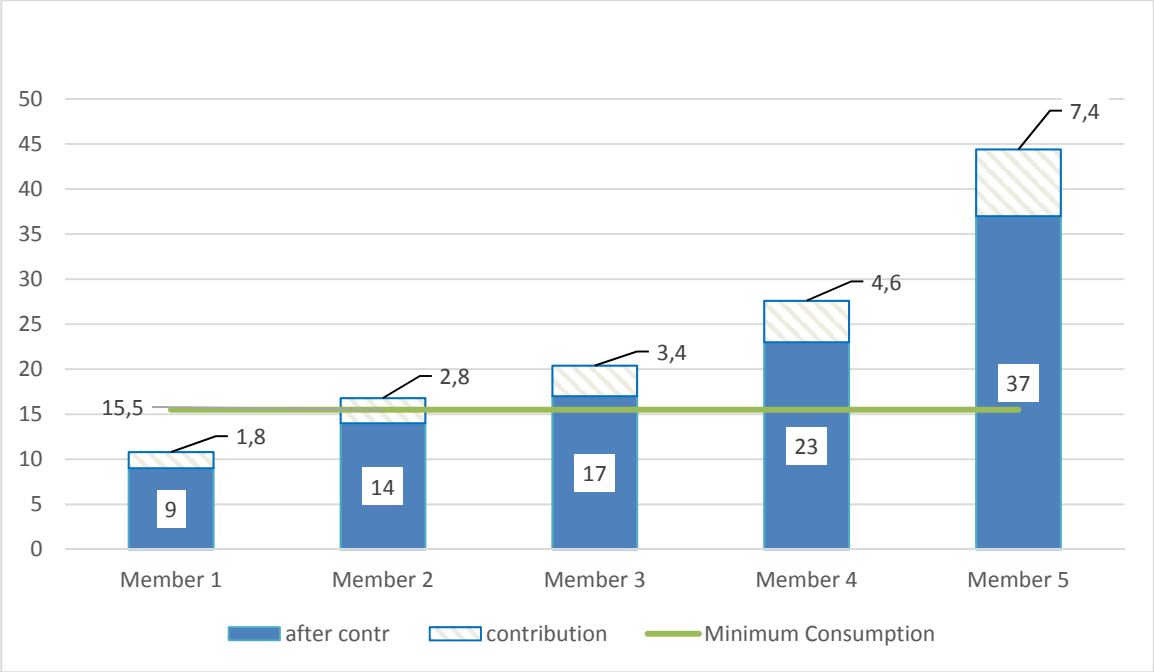
In order to ensure comparability between the distribution and the redistribution series, the initial endowments of the five group members in the redistribution series were originally higher before their contribution to the common fund (see Table 2, column 2). After the contribution to the common fund, the amounts of the endowments of the five members had the exact numerical val-

[6] The 'mixed principle' is similar to what Traub et al. refer to as "Boulding's principle", i.e. a "hybrid principle" that combines the maximization of average income "while observing a floor constraint" (see Traub et al. 2005: 291; see also Gaertner/Schokkaert 2012: 75-83; Boulding 1962). Boulding discusses the establishment of a "social minimum" in cases in which members of a society are not able to make a contribution to the social product (and therefore, according to the concept of desert, do "not deserve any reward out of it")', but receive funding from welfare services. According to Boulding, "The principle of desert may come into play above this social minimum. That is to say, society lays a modest table at which all can sup and a high table at which the deserving can feast" (Boulding 1962: 83).

[7] This is a minimum need. The term 'need' was not mentioned in the instructions.

ues as the endowments in the distribution series, i.e. 9, 14, 17, 23, 37 (see Table 2, column 3 and 4). By changing the initial scenario in this way, the experiment changed from a distribution experiment (distribution of an extra amount of tokens/resource windfalls) to a redistribution experiment (distribution of the deposited contributions). In both cases (distribution and redistribution), the minimum consumption line was fixed at 15.5 tokens. Again, if the participant's initial endowments were below the minimum consumption line, and they weren't provided with a sufficiently high amount out of the redistributed 20 tokens, they ran into debt. If they were above the line, they were able to save money during the five consecutive distribution rounds.

Table 2: Initial Endowments Redistribution Treatment (REDIS)



Redistribution Treatment	Endowment before contribution	contribution	Endowment after contribution
Member 1	10,8	1,8	9
Member 2	16,8	2,8	14
Member 3	20,4	3,4	17
Member 4	27,6	4,6	23
Member 5	44,4	7,4	37
Total	120	20	100

In the distribution as well as the redistribution experiments, participants were told that in case they reached a unanimous agreement on the suggested procedure within their group of five, the suggested procedure would become effective and the experimental payout would actually take

place according to the suggested procedure. They were also told that in case they wouldn't reach a unanimous agreement, they would get the opportunity to suggest an alternative distribution of the 20 tokens. The requirement for a decision on an alternative distribution in this subsequent stage of the experiment was simple majority. After the group members had learned about the effects of the one specific distribution procedure suggested to them (either equal distribution, weaker first, or mixed principle), group members were asked individually if they would accept the presented distribution procedure. They were also asked to state a reason for their individual decision. In order to do that, the experiment contained a screen with textboxes. The participants entered the reason for the acceptance or rejection of the suggested distribution procedure into the textbox, and the other four members were able to read and to evaluate the reasons presented by their fellow group members.[8] In the next phase of the experiment, the five group members were able to deliberate via chat[9] in order to reach a unanimous decision on whether they were willing to accept the suggested distribution procedure. After the deliberation period, they were again asked to state individual reasons for their decision. In case they reached a unanimous agreement and accepted the suggested procedure, they moved on to a subsequent stage of the experiment where they had the opportunity to discuss (via chat) whether or not they would have preferred one of the other two distribution procedures. Again, they were asked to state a reason for their preference.

In case a group didn't reach a unanimous decision to accept the suggested procedure, group members were asked to deliberate (via chat) on an alternative distribution of the 20 tokens. Again, they were asked to state reasons for their suggestions. In order to reach an agreement on an alternative distribution procedure, simple majority was required.

The initial suggestions for a distribution procedure were actually rejected by 22 of the 35 groups in the distribution treatment, and by 24 of the 38 groups in the redistribution treatment. These 46 groups moved on to the stage of the experiment where they were asked to deliberate an decide on an alternative distribution of the 20 tokens, while the 27 groups who accepted the initial distribution procedure moved on to the stage in which they were asked to discuss whether or not they would have preferred one of the other two possible procedures to the one they had already agreed on.

[8] During each of the three stages at which the participants were asked to state a reason, they were also asked to vote for the best reason presented by their fellow group members. At each of the three stages, the person with the highest number of votes for 'best reason' was granted an additional amount of 2 Euros that was added to his/her payout.

[9] They had the opportunity to chat for 5 minutes, using the chat function of z-Tree (Fischbacher 2007).

4. Results Quantitative Analysis

4.1 Acceptance of the Distribution Procedures – Individual Level before Deliberation

The individual and group preferences served as basis for our quantitative analysis of the acceptance of the suggested distribution procedures, as well as the stability of the acceptance.

At the individual level, the distribution procedure 'weaker first' (11/6/3/0/0) is the most frequently accepted distribution procedure. Before entering the chat room, 82.5% of all participants faced with this suggested distribution of the 20 tokens accept it. The equal distribution (4/4/4/4/4) and the distribution based on the mixed principle (6.5/1.5/1/4/7) are only accepted by 55.2% and 55.0% respectively (see Table 3). These two procedures are overall significantly less likely to be accepted than the weaker first procedure ($p<0.001$, Appendix, Table 16). However, Table 4 shows that the acceptance of the distribution procedures depends on the treatments. As we can see here, the dominance of the weaker first distribution procedure is only substantial and significant in the lottery treatment, but not in the effort treatment (for significance tests, see Appendix, Table 16). These findings, therefore, support hypothesis 2, i.e. the hypothesis that in contexts of effort-dependent unequal distribution and/or redistribution, the acceptance of a need-based distribution decreases, while the acceptance of an effort-based distribution increases.

Table 3: Overall individual acceptance/rejection of distribution procedures

		Equal Distribution	Weaker First	Mixed	Total
Acceptance	Count	69	99	66	234
	%	55,2%	82,5%	55,0%	64,1%
Rejection	Count	56	21	54	131
	%	44,8%	17,5%	45,0%	35,9%
Total	Count	125	120	120	365
	%	100,0%	100,0%	100,0%	100,0%

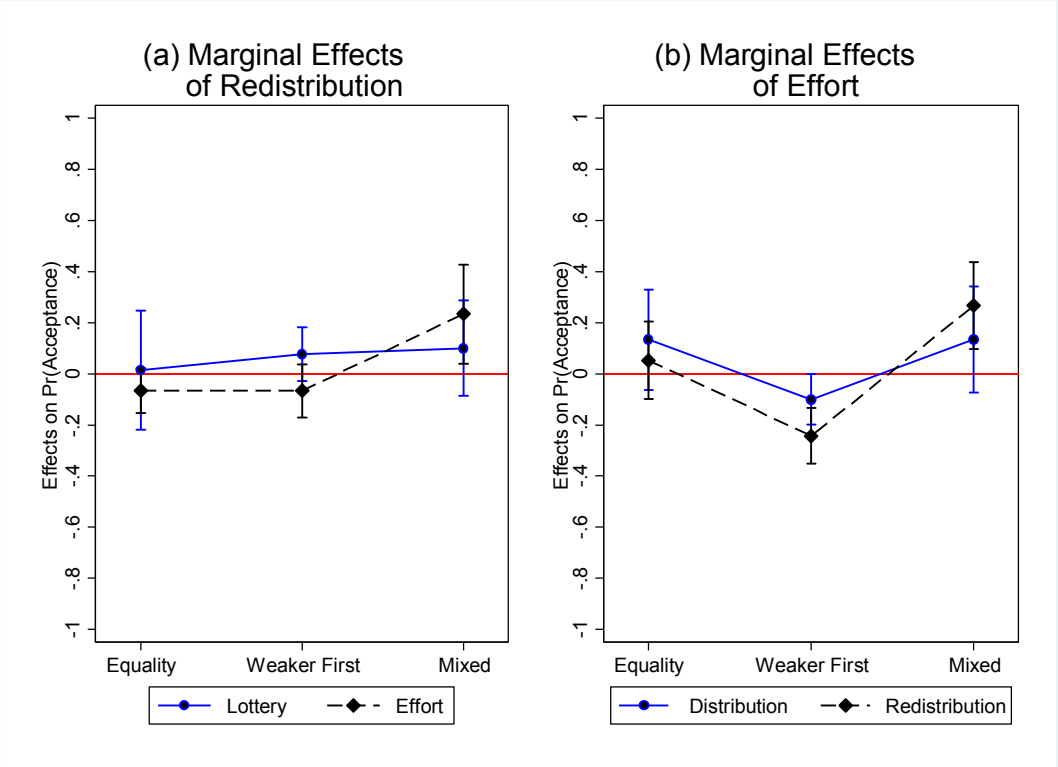
Table 4: Individual acceptance of distribution procedures in various treatment combinations

		Lottery			Effort			
		Equal Distribution	Weaker First	Mixed	Equal Distribution	Weaker First	Mixed	Total
Acceptance DIS	%	50.0%	86.7%	40.0%	63.3%	76.0%	53.3%	61.1%
	N	30	30	30	30	25	30	175
Acceptance REDIS	%	51.4%	94.3%	50.0%	56.7%	70.0%	76.7%	66.8%
	N	35	35	30	30	30	30	190

Notes. Summary table of the percentages of acceptances within the treatment combinations and the total number of cases in each combination.

Figure 1 depicts the effects of the treatments (a) redistribution and (b) effort on the likelihood of acceptance of the distribution procedures.[10] In the case of equal distribution, both treatments don't show a significant effect on the acceptance of this procedure. The weaker first procedure, on the other hand, is not significantly affected by the redistribution treatment, but significantly negatively affected by the effort treatment. The mixed principle is positively affected by redistribution and effort, however only significantly affected by a combination of those two treatments.

Figure 1: Marginal effects of (a) redistribution and (b) effort on the individual acceptance of distribution procedures



Notes. Figures derived from Model 4 of the linear probability regression in Appendix, Table 16 and its marginal effects in Appendix, Table 17. Confidence intervals: 95%.

4.2 Acceptance of the Distribution Procedures – Individual Level after Deliberation

After deliberation, 'weaker first' is even more popular than it was before deliberation, being accepted by 92.5% of all participants in this treatment. By contrast, the acceptance of the other two distribution procedures decreases. After deliberation, they are only accepted by less than 40% of the respective participants (Table 5). The linear probability model in Appendix, Table 18 shows

[10] Values above the red line indicate a positive effect of the treatments (a) redistribution and (b) effort, and values below the red line indicate a negative effect of these treatments on the probability of acceptance. The numbers represent a change in percentage points compared to the control groups. If the confidence interval extends on both, negative and positive areas, the effect is statistically insignificant with p values higher than 0.05.

that the dominance of the 'weaker first' procedure, that was already observable before deliberation, is also strongly significant after deliberation ($p<0.001$).

Table 6 shows the varying acceptances depending on the treatments. The votes for acceptance of a 'weaker first' distribution is extremely high in all treatments except the redistribution/effort treatment (with 73.3% acceptance), where it is as often accepted as the mixed procedure.

Table 5: Overall votes for the procedures after deliberation

		Equal Distribution	Weaker First	Mixed	Total
Acceptance	Count	47	111	44	202
	%	37.6%	92.5%	36.7%	55.3%
Rejection	Count	78	9	76	163
	%	62.4%	7.5%	63.3%	44.7%
Total	Count	125	120	120	365
	%	100.0%	100.0%	100.0%	100.0%

Table 6: Votes for the distribution procedures after deliberation in various treatment combinations

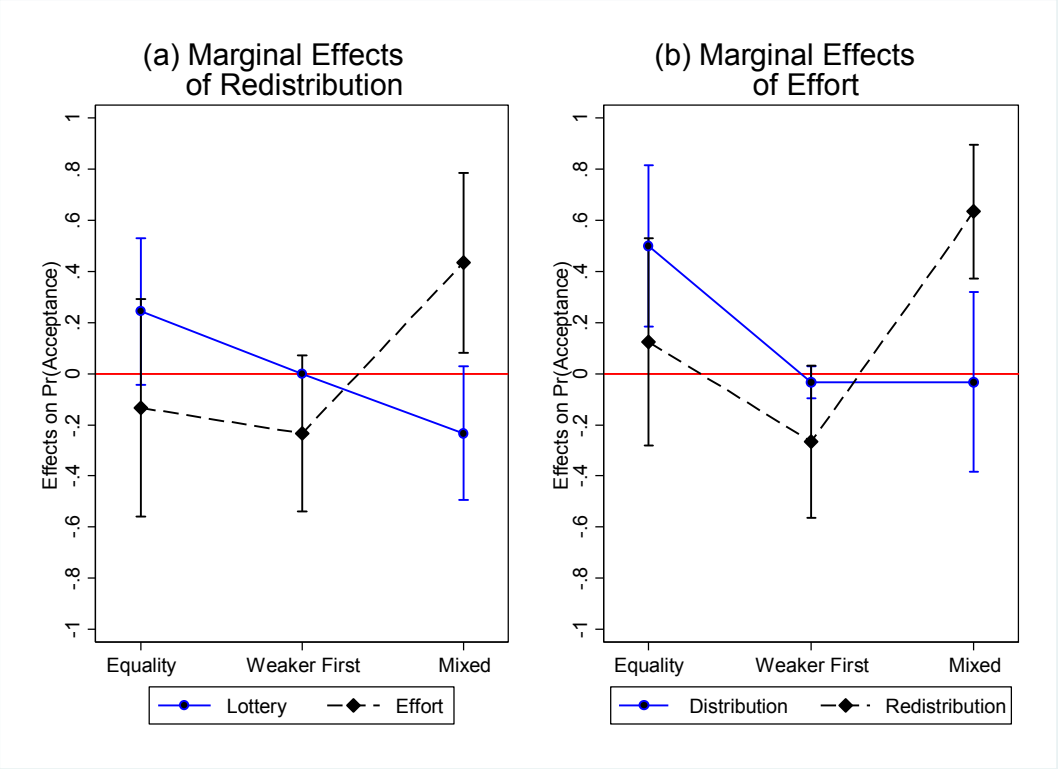
		Lottery			Effort			
		Equal Distribution	Weaker First	Mixed	Equal Distribution	Weaker First	Mixed	Total
Acceptance DIS	%	10.0%	100.0%	33.3%	60.0%	96.0%	30.0%	53.7%
	N	30	30	30	30	25	30	175
Acceptance REDIS	%	34.3%	100.0%	10.0%	46.7%	73.3%	73.3%	56.8%
	N	35	35	30	30	30	30	190

Notes. Summary table of the percentages of votes for acceptance within the treatment combinations and the total number of cases in each combination.

Figure 2 depicts the effects of the treatments (a) redistribution and (b) effort on the voting behavior after deliberation.[11] The equal distribution procedure is significantly positively affected by effort in the redistribution condition. There is no significant decrease in the acceptance of 'weaker first'. The procedure based on the mixed (i.e. 'Boulding') principle is positively affected by a combination of effort and redistribution, which leads to significantly higher acceptance rates than distribution and lottery.

[11] For an explanation of the graph, see footnote No. 7.

Figure 2: Marginal effects of (a) redistribution and (b) effort on the votes for distribution procedures after deliberation



Notes. Figures derived from Model 4 of the linear probability model in Appendix, Table 18 and its marginal effects in Appendix, Table 19. Confidence intervals: 95%.

4.3 Votes for the Distribution Procedures – Group Level

As already mentioned above, a total of 73 groups with five participants each participated in the experiments, and 27 of those 73 groups (36.99% of all groups, a total of 135 individuals) accepted the distribution procedure that was presented to them at the beginning of the experiment. 46 groups (63.01% of all groups, a total of 230 individuals) did not accept the suggested distribution procedure. Of the 27 groups that accepted the initially suggested procedure, 20 groups accepted the weaker first procedure (83.3% of all groups with this procedure, i.e. 100 individuals), but only 7 groups (14.3% of all groups in these procedures, i.e. 35 individuals) accepted one of the other two procedures (Table 7). Hence, the weaker first procedure was significantly more often accepted in the unanimous group decisions than the other two procedures (see Appendix, Table 20).

In the context of the data from Table 5, which shows the votes for acceptance and rejection, it becomes clear that although 36.7-37.6 percent of the participants voted for group acceptance of

the equal distribution and mixed distribution, only 12.5-16.0 percent of the groups accepted these procedures – due to the unanimity requirement.

In Table 8, the percentages of all groups who accepted their initially suggested procedures are presented for the various treatment combinations. While in the effort treatment, the weaker first procedure is only slightly more often accepted than the other two procedures, its dominance in the lottery treatment is substantial. The linear probability model in Appendix, Table 20 supports this finding and shows that the dominance of the weaker first procedure is highly significant – although it significantly loses support in the effort treatment.

Table 7: Overall acceptance of the distribution procedures by the groups

		Equal Distribution	Weaker First	Mixed	Total
Acceptance	Count	4	20	3	27
	%	16.0%	83.3%	12.5%	37.0%
Rejection	Count	21	4	21	46
	%	84.0%	16.7%	87.5%	63.0%
Total	Count	25	24	24	73
	%	100.0%	100.0%	100.0%	100.0%

Table 8: Acceptance of the distribution procedures by the groups in various treatment combinations

		Lottery			Effort			
		Equal Distribution	Weaker First	Mixed	Equal Distribution	Weaker First	Mixed	Total
Acceptance DIS	%	0.0%	100.0%	0.0%	33.3%	80.0%	16.7%	37.1%
	N	6	6	6	6	5	6	35
Acceptance RE-DIS	%	14.3%	100.0%	0.0%	16.7%	50.0%	33.3%	36.8%
	N	7	7	6	6	6	6	38

Notes. Summary table of the percentages of votes for acceptance by the groups within the treatment combination and the total number of cases in each combination.

4.4 Deliberation Effects

If we summarize the findings from Table 4 and Table 6, it is obvious that there are changes in the individual acceptance of distribution procedures before and after deliberation (see Table 9). The deliberation via chat window, as well as the presentation of reasons for or against a distribution procedure in the respective textboxes, do have an effect on individual preferences. Overall, the individual acceptance of the weaker first principle is higher after deliberation, while the individual acceptance of equal distribution and the mixed principle is lower after deliberation (see Table 9). These findings support hypothesis 3.

If we look at the attitude changes concerning the different distribution procedures in more detail, the following findings are of interest: In total, 108 (29.6%) of the participants voted either

against prior acceptance (19.2%) or against prior rejection (10.4%). About twice as many individuals in the equal distribution and mixed distribution than in the weaker first condition changed their attitudes (Table 10). As we can see in Table 10, the acceptance of equal distribution as well as the mixed principle decreases after deliberation, while there is an increase in the acceptance of the weaker first principle after deliberation.

Table 9: Stability of Acceptance of Distribution Procedures before and After Deliberation

			Lottery			Effort			
			Equal Distribution	Weaker First	Mixed	Equal Distribution	Weaker First	Mixed	Total
Individual Acceptance before Deliberation	**Acceptance DIS**	%	50,00%	86,70%	40,00%	63,30%	76,00%	53,30%	61,10%
		N	30	30	30	30	25	30	175
	Acceptance REDIS	%	51,40%	94,30%	50,00%	56,70%	70,00%	76,70%	66,80%
		N	35	35	30	30	30	30	190
Individual Acceptance after Deliberation	**Acceptance DIS**	%	10,00%	100,00%	33,30%	60,00%	96,00%	30,00%	53,70%
		N	30	30	30	30	25	30	175
	Acceptance REDIS	%	34,30%	100,00%	10,00%	46,70%	73,30%	73,30%	56,80%
		N	35	35	30	30	30	30	190
Group Level Acceptance	**Acceptance DIS**	%	0,00%	100,00%	0,00%	33,30%	80,00%	16,70%	37,10%
		N	6	6	6	6	5	6	35
	Acceptance REDIS	%	14,30%	100,00%	0,00%	16,70%	50,00%	33,30%	36,80%
		N	7	7	6	6	6	6	38

Table 10: Overall attitude changes yes/no for distribution procedures

		Equal Distribution	Weaker First	Mixed	Total
Voted against prior acceptance	Count	34	5	31	70
	%	27.2%	4.2%	25.8%	19.2%
No change	Count	79	98	80	257
	%	63.2%	81.7%	66.7%	70.4%
Voted against prior rejection	Count	12	17	9	38
	%	9.6%	14.2%	7.5%	10.4%
Total	Count	125	120	120	365
	%	100.0%	100.0%	100.0%	100.0%

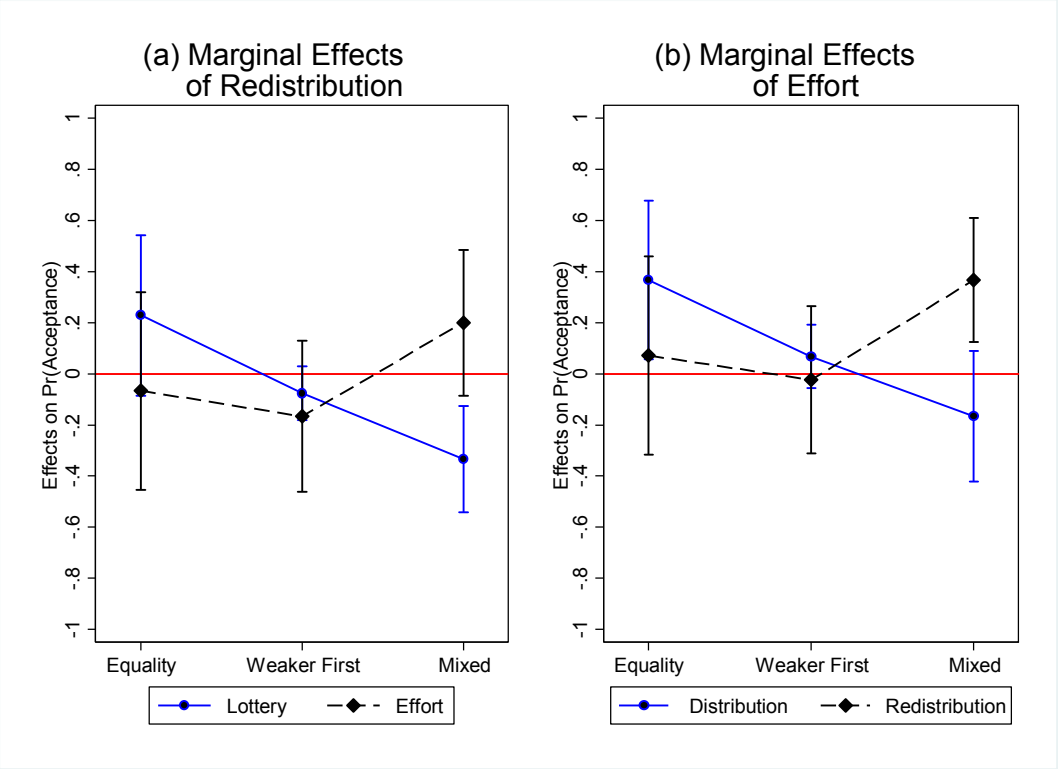
Table 11: Attitude changes in various treatment combinations

			Lottery			Effort			
			Equal Distribution	Weaker First	Mixed	Equal Distribution	Weaker First	Mixed	Total
Attitude	change	%	-40.0%	13.3%	-6.7%	-3.3%	20.0%	-23.3%	-7.4%
DIS		N	30	30	30	30	25	30	175
Attitude	change	%	-17.1%	5.7%	-40.0%	-10.0%	3.3%	-3.3%	-10.0%
REDIS		N	35	35	30	30	30	30	190

Notes. Summary table of the percentages of attitude changes within the treatment combinations and the total number of cases in each combination. Positive values signify that changes toward acceptance prevailed. Negative values signify that changes toward rejection prevailed. Zero indicates either that there were as many changes toward acceptance as toward rejection or no changes at all.

Table 11 and Figure 3 show the direction of the attitude changes in the diverse treatments.[12] Lottery significantly affects more people to vote against prior acceptance than effort, but only in the distribution treatment. In case of the weaker first distribution procedure, neither treatment significantly changes the individual's voting behavior. In the mixed procedure, a redistribution/effort treatment combination seems to raise individuals' likelihoods to vote against prior rejection, while a redistribution/lottery mix seems to have the opposite effect.

Figure 3: Marginal effects of (a) redistribution and (b) effort on attitude changes towards acceptance or rejection



Notes. Figures derived from Model 4 of the linear probability regression in Appendix, Table 21 and its marginal effects table in Appendix, Table 22. Dependent variable: Voting for/against prior attitude [-1 changed to rejection, 0 did not change, 1 changed to acceptance]. Confidence intervals: 95%.

4.5 Proposed Alternative Distributions

Table 12 shows the mean and median suggestions for allocations toward each group member and Figure 4 depicts the prediction of means that result from the regression in Appendix, Table 23.[13] A clear pattern can be observed. In the mean, the groups granted the members with the lowest initial endowments the largest share and allocated the rest of the money in descending quantity to the members with higher initial endowments. Although this pattern is prevalent in all treatment combinations, it is mitigated in the redistribution and effort treatments. The regression model in

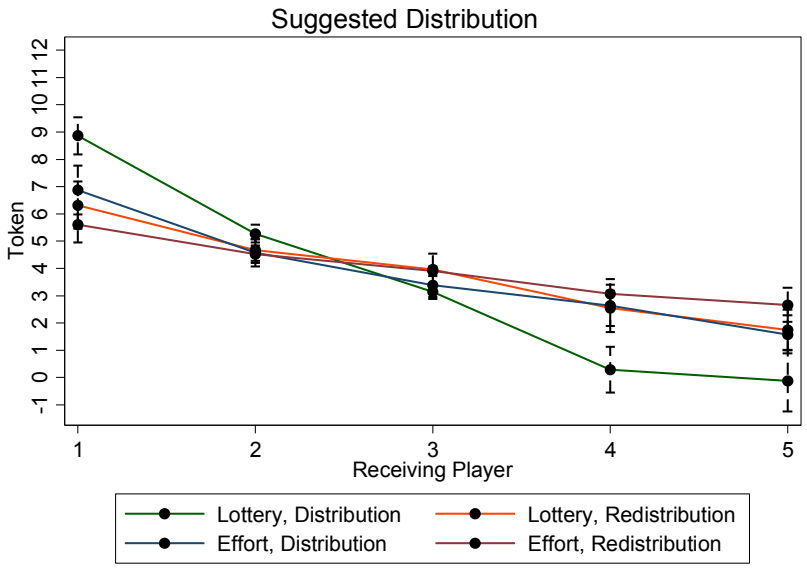
[12] For an explanation of the graph, see footnote Number 7.
[13] In the tobit regression, one prediction is below the limit of 0. We added a simple OLS regression for comparison in Appendix, Table 27 to Table 28 and Figure 7.

Appendix, Table 24 shows that this pattern is highly significant. However, the effect of the treatments is not significant for all members (see Appendix, Table 26).

Table 12: Mean and median suggestions for alternative distributions in various treatment combinations

	Distribution				Redistribution			
	Lottery Mean (n=60)	Lottery Median (n=60)	Effort Mean (n=50)	Effort Median (n=50)	Lottery Mean (n=60)	Lottery Median (n=60)	Effort Mean (n = 60)	Effort Median (n =60)
To Member 1	8.9	11.0	6.9	8.0	6.4	6.3	5.7	6.0
To Member 2	5.3	6.0	4.6	5.0	4.7	5.0	4.5	5.0
To Member 3	3.2	3.0	3.5	4.0	4.0	4.0	3.9	4.0
To Member 4	1.4	0.0	2.9	2.5	2.8	3.0	3.1	3.0
To Member 5	1.3	0.0	2.1	2.0	2.2	2.0	2.8	2.3

Figure 4: Suggested distributions – predicted allocations



Notes. Figure is derived from model 4 of the tobit regression model in Appendix, Table 23 and its margins in Appendix, Table 24. Confidence intervals: 95%.[14]

[14] Please note that the variable on the x-axis is ordinal scaled. Hence, the lines between the receiving members depict only the difference between the suggested allocations.

4.6 Alternative Distributions

Table 13 shows the actual mean and median allocations toward each member. Again, a clear pattern of disproportional distributions can be observed, meaning that the groups allocated, in the mean, the largest share to the member with the lowest endowments and the rest of the money in descending amounts to the members with higher initial endowments. Although this pattern is prevalent in all treatment combinations, it is mitigated in the redistribution and effort treatments, which caused smaller allocations to the members with less initial endowment and thus higher allocations to the members with higher initial endowments – however, still disproportionally.

Figure 5 shows this pattern, and the tobit regression in Appendix, Table 29 shows that this pattern is highly significant.[15]

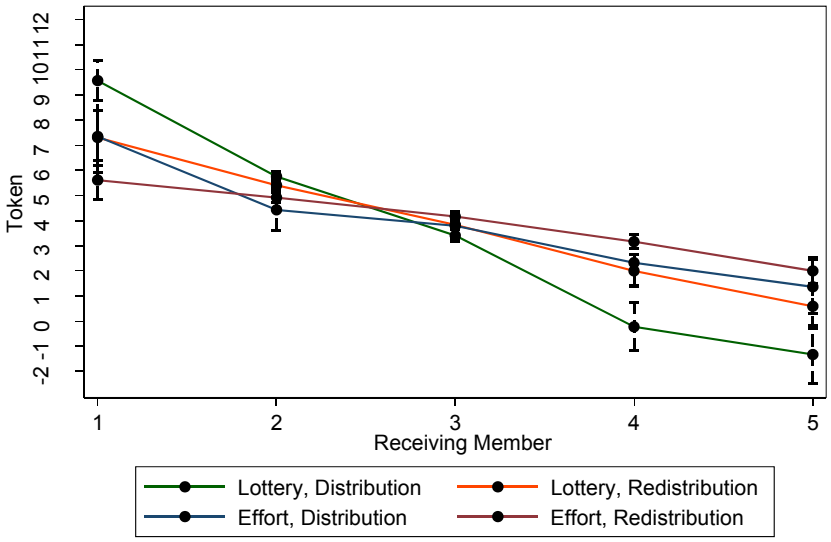
Table 13: Mean and median alternative distributions in various treatment combinations

	Disribution				Redistribution			
	Lottery Mean (n=60)	Lottery Median (n=60)	Effort Mean (n=50)	Effort Median (n=50)	Lottery Mean (n=60)	Lottery Median (n=60)	Effort Mean (n =60)	Effort Median (n =60)
To Member 1	9.6	11.0	7.4	8.5	7.3	7.5	5.7	6.0
To Member 2	5.8	6.0	4.5	5.5	5.4	5.5	4.9	5.0
To Member 3	3.4	3.0	3.8	4.0	3.8	4.0	4.2	4.0
To Member 4	0.8	0.0	2.5	2.0	2.2	2.0	3.2	3.0
To Member 5	0.4	0.0	1.8	1.0	1.3	0.5	2.1	2.0

At least to some extent, the findings support hypothesis 2. In contexts of real effort tasks and/or redistribution, the acceptance of a need-based distribution decreases, while the acceptance of an effort-based distribution increases. It has to be pointed out, however, that there is still a very strong support for a need-based distribution, while the support for an effort-based distribution principle stays at a much lower level. Therefore, the assumption that, following Frohlich and Oppenheimer (1990, 1992), a mixed criterion based on need and effort would play a significant role in our findings has not been confirmed.

[15] In the tobit regression, two predictions were below the limit of 0. We added a simple OLS regression and their margins for comparison in Appendix, Table 32, Table 33 and Figure 8.

Figure 5: Chosen distributions – predicted allocations



Notes. Graph is depicted of regression Model 4 in Appendix, Table 30 and its margins in Appendix, Table 31. Confidence intervals: 95%.[16]

In order to get to a deeper understanding of the actual reasons why people prefer a certain distribution procedure, and in order to learn more about the ways in which distribution principles like need, equality and effort are combined in the sense of a 'mixed criterion', we studied the content of the chats and the argument textboxes. In the following, we present some very initial findings from this qualitative analysis.[17]

5. Content Analysis, Alternative Distribution

The following analysis is based on a particular section of the text data. As already mentioned, the initial suggestions for a distribution procedure were rejected by 22 of the 35 groups in the distribution treatment, and by 24 of the 38 groups in the redistribution treatment. At that point, the subjects were asked to suggest an alternative distribution for the 20 tokens. The following analysis is based on the text data from the alternative suggestions of these 46 groups who rejected the initially suggested distribution procedure.[18] At this stage of the experiment, they were, again,

[16] Please note that the variable on the x-axis is ordinal scaled. Hence, the lines between the receiving members depict only the difference between the chosen allocations.
[17] The systematic coding of the qualitative data is still under way. The following results are based on a simplified preliminary coding.
[18] As already mentioned, the 27 groups who accepted the suggested distribution procedure moved on to a stage of the experiment in which they were asked to deliberate if they would still prefer the accepted procedure when com-

able to deliberate with the other four members of their group via chat, and they were also asked to state a reason for their suggested alternative distribution.

A total of 230 subjects from 46 groups, 110 from the distribution treatment and 120 from the redistribution treatment, suggested an alternative distribution and presented a reason for this alternative suggestion. The following analysis is based on those sections of the text data in which the 46 groups presented their alternative suggestions.

With regard to hypothesis 1 ("Need is accepted as a distribution criterion, but only in combination with other principles."), the following findings are of particular interest:

In the 110 reasons stated in the distribution treatment (see Table 14), there is a tendency to refer to only one principle (43 subjects refer only to equality, 10 only to need, 5 only to effort). In those cases in which subjects refer to a 'mixed criterion', they mostly refer to a combination of equality and need (17 subjects refer to this mixed criterion).

Table 14: Distribution of Principles referred to during Reason-Giving Stage, Suggested Alternative Distribution (DIS, 110 subjects)

Equality	**43**
Need	**10**
Effort	**5**
Proportionality	**2**
Maximization of Overall Group Profit	**1**
Fairness	**5**
Equality and Effort	**6**
Equality and Need	**17**
Proportionality and Need	**7**
Need and Effort	**1**
Equality and Proportionality	**1**
Equality and Altruism[19]	**1**
Need and Altruism	**1**
Equality, Need and Effort	**1**
Equality, Need and Proportionality	**1**
No Specific Reason Stated	**8**

In the redistribution treatment, there is a stronger tendency to use mixed criteria (see Table 15). The amount of reasons that refer to only one principle decreases (26 equality, 10 need, 1 effort). Therefore, hypothesis 1 is supported especially by the data from the redistribution treatment. The

pared to the two alternative distribution procedures that were suggested to the other groups. The data of these 27 groups (135 participants) is not part of the following analysis.

[19] In our context, "altruism" refers to a principle that is expressed in sentences like "everyone should get at least one" (McAuliffe et al. 2017: 3).

mixed criterion that is referred to most, however, is still need and equality (referred to by 19 subjects).

While there is a stronger tendency in the redistribution treatment to refer to proportionality and altruism (i.e. "everyone should get at least one", see FN 16), the reference to effort as a standalone reason decreases to one single finding.

Table 15: Distribution of Principles referred to during Reason-Giving Stage, Suggested Alternative Distribution (REDIS, 120 subjects)

Equality	**26**
Need	**10**
Effort	**1**
Proportionality	**7**
Maximization of Overall Group Profit	**3**
Fairness	**4**
Equality and Effort	**4**
Equality and Need	**19**
Proportionality and Need	**9**
Need and Effort	**5**
Equality and Proportionality	**3**
Equality and Altruism	**6**
Need and Altruism	**3**
Equality and Maximization of Overall Group Profit	**1**
Proportionality and Effort	**1**
Effort and Altruism	**1**
Proportionality and Altruism	**1**
Equality, Need and Effort	**1**
Equality, Need and Altruism	**2**
Need, Effort, Proportionality	**1**
Need, Proportionality, Altruism	**2**
Suggestion leads to Agreement	**3**
No Specific Reason Stated	**7**

Overall, the text data shows that the acceptance of the 'weaker first' principle is at a very high level. The strongest motive for doing so is that all of the group members should to get out of debt. This motive is stated very frequently by the participants. In the distribution treatment, debt avoidance is combined with the motive that everyone should reach a plus and get a chance to save at least a small amount. Therefore, the participants with the lowest initial endowments are not only provided with an amount that leaves them with a total of 15.5 tokens (a distribution result that would allow them to just meet the amount needed for minimum consumption), but they are provided with a higher amount. The reasons stated for doing so are expressed in sentences like "Everyone should get the chance to earn a small amount of savings". In the distribution

treatment, participants state quite frequently that their overall aim is to enable all of the group members to save at least a small amount of tokens.

While overall, the reasons entered into the textboxes show that a distribution based on need is accepted by most of the participants, the need principle is often combined with conceptions of equal distribution. In a lot of cases in which participants suggest an alternative distribution, the alternative distribution is characterized as a "balance", "alignment" or "harmonization" of the final distribution. In the distribution treatment, they specifically prefer 11/6/3/0/0 – not because it is identical to the suggested 'weaker first' distribution, but because it results in the following final distribution: 20/20/20/23/37. In the reason-giving stage, participants hint at the fact that since they are not able to withdraw money from the endowments of member 4 and member 5 who already have more than 20 tokens as initial endowments, the 20/20/20/23/37 distribution is the closest they can get to an equal distribution among all five group members.

The situation changes in the redistribution treatment. Although the participants still accept the 'weaker first' principle to a high degree, their willingness to accept a distribution like 11/6/3/0/0 decreases. The reasons presented in the text data can be summed up as follows: In the redistribution treatment, a lot of the participants refuse to give 0 tokens to member 4 and member 5. Although their overall priority is still debt avoidance, the willingness to provide member 1 and member 2 with an amount that enables them to save a small amount decreases. By contrast, the willingness to give at least a small amount to everyone, including member 4 and member 5, increases. The reasons presented are expressed in sentences like: "Everyone should get something" or "Everyone should get at least one token".

Especially in the effort treatment, participants state that they consider it unfair that member 4 and member 5, who were the high performers in the initial test and contributed the highest amounts to the common fund of 20 tokens, end up with nothing when it comes to the subsequent distribution of the fund. The refusal to leave member 4 and member 5 empty-handed is strong, despite the fact that these two members are already way above the minimum consumption line due to their high initial endowments.

Overall, the data seems to support hypotheses 2 – with one restriction: The increase of acceptance for an effort-based distribution is smaller than expected. The text data also supports hypothesis 3: The level of acceptance for a need-based distribution is higher in cases in which people deliberate on the reasons for a need-based distribution, i.e. in cases in which the reasons for the need-based distribution are made transparent.

6. Concluding Remarks

Our findings suggest that the principle of need and the procedure of a need-based distribution play an important role when it comes to the distribution and redistribution of resources under conditions of inequality. The overall acceptance of the need-based 'weaker first' distribution procedure remains high across all treatment variations – significantly higher than the acceptance rates of the other two suggested procedures (equal distribution and mixed principle).

However, the acceptance of a need-based distribution decreases in the redistribution experiments – especially in treatments in which the inequality among the participants is caused by a varying degree of performance in a preceding test (effort). In these cases, participants prefer to a higher degree a distribution in which the two members with the lowest initial endowments are, on the one hand, able to meet the requirements of the minimum consumption line – and do not get into debt. But on the other hand, the willingness to provide them with a higher amount that enables them to save a little amount decreases in the redistribution/effort treatment. While the overall guiding principles are need and equality, the redistribution/effort treatment is a context in which participants tend to prefer a principle that also takes individual performance and contribution to the common fund into account, i.e. a principle that combines a floor constraint with the maximization of income (similar to the 'Boulding' principle discussed by Traub et al. 2005, see also Boulding 1962).

In the text data, a slightly different motive for this shift of preference in the redistribution/effort treatment can be identified: In the redistribution/effort treatment, participants express a reluctance to vote for a distribution that leaves the 'high performers', i.e. member 4 and member 5 who were most successful in the test and contributed the most to the common fund – with 0 Tokens. While the distribution 11/6/3/0/0 (which equals the distribution in the 'weaker first' procedure) is extremely popular in the distribution treatments,[20] the acceptance for a distribution that leaves member 4 and member 5 with 0 Tokens is conceived as unfair in the redistribution treatments. Here, the idea that "Everyone should get something", i.e. at least a small share of the common fund, prevails.

Moreover, at least at a first glance, our overall findings seem to suggest that hypothesis 1, i.e. the assumption that need is accepted as a distribution criterion, but only in combination with other principles, is only partially supported. In a lot of cases – especially in the distribution treatment –

[20] As outlined above, a distribution of 11/6/3/0/0 leads to a final outcome of 20/20/20/23/37, which is the closest the participants can get to an equal distribution of the extra tokens among all five group members. The high acceptance rates of a final distribution of 20/20/20/23/37 highlight the importance of a distribution that combines aspects of need and equality.

a distribution identical or similar to 'weaker first' is accepted, but not justified based on the concept of need, but based solely on the principle of equality. This finding may be explained by the fact that the 'weaker first' distribution not only leads to need satisfaction with regard to the two group members in need, but also to a distribution that is the closest the groups can get to an equal outcome for all five members.

On closer inspection, however, the finding that subjects justify a need-based distribution like 'weaker first' by referring solely to equality may also be explained by the close proximity of the two principles of need and equality, a proximity that is expressed in the definition of need presented by Nicholas Rescher: the principle of need "professes to treat them, not equally, but so as to *make* them as equal as possible" (Rescher 1966: 75). This would hint at the fact that need is accepted as a partial criterion (in combination with equality), but that participants express their view that a combination of need and equality is the most adequate principle by referring solely to the outcome of a need-based distribution (i.e., by referring solely to equality). According to this interpretation of the data, the underlying principle is actually a combination of need and equality, but the fact that only equality is mentioned by the participants is caused by the desired outcome of a need-based distribution, i.e. by the desire is to make group members as equal as possible (through the fulfillment of needs).

In sum, it can be assumed that a balance between the two principles of need and equality – or in the case of redistribution/effort slightly more between need and effort – is considered to be more important by the subjects than the mere fulfillment of need.

Finally, our findings suggest that deliberation has an effect on the acceptance of a need-based distribution. While the acceptance of the other two initially suggested distribution procedures (equal distribution and mixed principle) decreases after deliberation, the acceptance of a need-based distribution increases after deliberation. The reason for this increase may lie in the fact that through a deliberation process – in our case, furthered by an experimental design that explicitly includes a reason-giving stage –, the whole idea behind a distribution based on need becomes more transparent. People learn more about actual needs, about the persons who are in need, and about other people's reasons for or against the acceptance of a distribution based on needs.

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Appendix

Acceptance of the Distribution Procedures – Individual Level before Deliberation

Table 16: Acceptance of distribution procedures – linear probability models

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Weaker First	0.27***	0.27***	0.38***	0.37***
	(0.04)	(0.05)	(0.08)	(0.10)
Mixed	-0.00	-0.00	-0.15	-0.10
	(0.05)	(0.05)	(0.09)	(0.12)
Redistribution		0.05	-0.02	0.01
		(0.04)	(0.06)	(0.12)
Effort		0.04	0.09	0.13
		(0.04)	(0.06)	(0.10)
Weaker First*Redistribution			0.04	0.06
			(0.08)	(0.13)
Mixed*Redistribution			0.19**	0.09
			(0.09)	(0.15)
Weaker First*Effort			-0.27***	-0.24**
			(0.07)	(0.11)
Mixed*Effort			0.11	0.00
			(0.09)	(0.14)
Redistribution*Effort				-0.08
				(0.12)
Weaker First*Effort*Redistribution				-0.06
				(0.15)
Mixed*Effort*Redistribution				0.21
				(0.18)
Constant	0.55***	0.51***	0.52***	0.50***
	(0.03)	(0.05)	(0.07)	(0.09)
R2	0.07	0.08	0.11	0.12
Adjusted R-squared	0.07	0.07	0.09	0.09

Notes. Linear Probability Regressions. N=365. Dependent variable: Individual acceptance of the proposed distribution procedure before entering the chat [0,1]. Model 1 contains the distribution procedures; omitted category: Equal distribution. Model 2 includes the main effects of the treatments redistribution and effort. Model 3 includes all two-way interactions of the treatments redistribution and effort with the proposed distribution procedures. Model 4 adds all three-way interaction effects. Robust standard errors that took the clustered structure of the data in account are in parentheses. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.[21]

[21] The same regression model was also calculated with the omitted group (see FN 4) and also with control for the sociodemographic variables gender (male, female), age (in years), main subject of studies (economical or not), having experience with being jobless, working or not, and income (4 categories: under 400 Euro, 400-699.99 Euro, 700-99.99 Euro, above 1000 Euro). No qualitative differences were found between the models.

Table 17: Acceptance of distribution procedures – marginal effects

Procedure		Influence of	dy/dx	Std. Err	t	sig	Conf-	Conf+
Equal Distribution	Lottery	Redistribution	0.01	0.12	0.12	0.90	-0.22	0.25
	Effort	Redistribution	-0.07	0.04	-1.52	0.13	-0.15	0.02
	Distribution	Effort	0.13	0.10	1.36	0.18	-0.06	0.33
	Redistribution	Effort	0.05	0.08	0.69	0.50	-0.10	0.20
Weaker First	Lottery	Redistribution	0.08	0.05	1.45	0.15	-0.03	0.18
	Effort	Redistribution	-0.06	0.06	-1.08	0.28	-0.17	0.05
	Distribution	Effort	-0.11	0.05	-1.99	0.05	-0.21	0.00
	Redistribution	Effort	-0.24	0.05	-4.46	0.00	-0.35	-0.13
Mixed	Lottery	Redistribution	0.10	0.09	1.07	0.29	-0.09	0.29
	Effort	Redistribution	0.23	0.10	2.40	0.02	0.04	0.43
	Distribution	Effort	0.13	0.10	1.28	0.20	-0.07	0.34
	Redistribution	Effort	0.27	0.09	3.11	0.00	0.10	0.44

Notes. Marginal Effects depending on Model 4 of the linear probability models in Table 16.

Votes for Distribution Procedures

Table 18: Votes for distribution procedures after deliberation – linear probability models

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Weaker First	0.55***	0.55***	0.86***	0.90***
	(0.09)	(0.09)	(0.10)	(0.06)
Mixed	-0.01	-0.01	-0.03	0.23**
	(0.10)	(0.10)	(0.14)	(0.11)
Redistribution		0.02	0.06	0.24*
		(0.07)	(0.13)	(0.14)
Effort		0.15**	0.30**	0.50***
		(0.07)	(0.14)	(0.16)
Weaker First*Redistribution			-0.17	-0.24*
			(0.15)	(0.14)
Mixed*Redistribution			0.04	-0.48**
			(0.19)	(0.19)
Weaker First*Effort			-0.47***	-0.54***
			(0.16)	(0.16)
Mixed*Effort			-0.00	-0.53**
			(0.19)	(0.24)
Redistribution*Effort				-0.38
				(0.26)
Weaker First*Effort*Redistribution				0.15
				(0.30)
Mixed*Effort*Redistribution				1.04***
				(0.34)
Constant	0.38***	0.30***	0.20**	0.10
	(0.07)	(0.08)	(0.09)	(0.06)
R-squared	0.27	0.30	0.35	0.41
Adjusted R-squared	0.27	0.29	0.34	0.39

Notes. Linear Probability Regressions. N=365. Dependent Variable: Individual vote/acceptance of the suggested distribution procedure after deliberation [0,1]. Model 1 contains the distribution procedures; omitted category: Equal distribution. Model 2 includes the main effects of the treatments redistribution and effort. Model 3 includes all two-way interactions of the treatments redistribution and effort with the proposed distribution procedures. Model 4 adds all three-way interaction effects. Robust standard errors that took the clustered structure of the data in account are in parentheses. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.[22]

[22] The same regression model was also calculated with the omitted group (see FN 4) and also with control for the sociodemographic variables gender (male, female), age (in years), main subject of studies (economical or not), having experience with being jobless, working or not, and income (4 categories: under 400 Euro, 400-699.99 Euro, 700-99.99 Euro, above 1000 Euro). No qualitative differences were found between the models.

Table 19: Votes for distribution procedures after deliberation – marginal effects

		Influence of	dy/dx	Std. Err	t	Sig	Conf-	Conf+
Equal Distribution	Lottery	Redistribution	0.24	0.14	1.69	0.10	-0.04	0.53
	Effort	Redistribution	-0.13	0.21	-0.62	0.54	-0.56	0.29
	Distribution	Effort	0.50	0.16	3.16	0.00	0.18	0.82
	Redistribution	Effort	0.12	0.20	0.61	0.55	-0.28	0.53
Weaker First	Lottery	Redistribution	0.00	0.00	0.00	1.00	0.00	0.00
	Effort	Redistribution	-0.23	0.15	-1.47	0.15	-0.53	0.08
	Distribution	Effort	-0.04	0.04	-1.09	0.28	-0.11	0.03
	Redistribution	Effort	-0.27	0.15	-1.78	0.08	-0.57	0.03
Mixed	Lottery	Redistribution	-0.23	0.13	-1.78	0.08	-0.50	0.03
	Effort	Redistribution	0.43	0.18	2.45	0.02	0.08	0.79
	Distribution	Effort	-0.03	0.18	-0.19	0.85	-0.39	0.32
	Redistribution	Effort	0.63	0.13	4.82	0.00	0.37	0.90

Notes. Marginal Effects depending on Model 4 of the linear probability models in Table 18.

Votes for Distribution Procedures – Group Level

Table 20: Acceptance of the distribution procedures by the groups – linear probability models

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Weaker First	0.67***	0.67***	0.99***	1.00***
	(0.11)	(0.11)	(0.11)	(0.00)
Mixed	-0.03	-0.04	-0.12	0.00
	(0.10)	(0.10)	(0.11)	(0.00)
Redistribution		-0.02	-0.01	0.14
		(0.09)	(0.15)	(0.14)
Effort		0.02	0.17	0.33
		(0.09)	(0.15)	(0.21)
Weaker First*Redistribution			-0.13	-0.14
			(0.20)	(0.14)
Mixed*Redistribution			0.09	-0.14
			(0.20)	(0.14)
Weaker First*Effort			-0.54**	-0.53*
			(0.21)	(0.29)
Proportional*Effort			0.08	-0.17
			(0.20)	(0.27)
Redistribution*Effort				-0.31
				(0.30)
Weaker First*Effort*Redistribution				0.01
				(0.43)
Mixed*Effort*Redistribution				0.48
				(0.41)
Constant	0.16**	0.16*	0.08	-0.00
	(0.07)	(0.09)	(0.08)	(0.00)
R-squared	0.45	0.45	0.54	0.56
Adjusted R-squared	0.44	0.42	0.48	0.48

Notes. Linear Probability Regressions. N=73. Dependent Variable: Group acceptance of the distribution procedure after the chat [0,1]. Model 1 contains the distribution procedures; omitted category: Equal distribution. Model 2 includes the main effects of the treatments redistribution and effort. Model 3 includes all two-way interactions of the treatments redistribution and effort with the proposed distribution procedures. Model 4 adds all three-way interaction effects. No standard errors are shown for the main effects of the distribution procedures since they could be explained perfectly, hence showed no variance. Robust standard errors that took the clustered structure of the data in account are in parentheses. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.[23]

[23] The same regression model was also calculated with the omitted group (see FN 4). No qualitative differences were found between the models.

Deliberation Effects

Table 21: Attitude changes – linear probability models

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Weaker First	0.28***	0.28***	0.48***	0.53***
	(0.08)	(0.08)	(0.10)	(0.09)
Mixed	-0.01	-0.01	0.12	0.33***
	(0.09)	(0.08)	(0.12)	(0.09)
Redistribution		-0.03	0.09	0.23
		(0.06)	(0.13)	(0.16)
Effort		0.11*	0.21	0.37**
		(0.06)	(0.13)	(0.16)
Weaker First*Redistribution			-0.20	-0.30*
			(0.15)	(0.17)
Mixed*Redistribution			-0.15	-0.56***
			(0.16)	(0.19)
Weaker First*Effort			-0.20	-0.30*
			(0.15)	(0.17)
Mixed*Effort			-0.11	-0.53**
			(0.17)	(0.20)
Redistribution*Effort				-0.30
				(0.25)
Weaker First*Effort*Redistribution				0.20
				(0.30)
Mixed*Effort*Redistribution				0.83***
				(0.31)
Constant	-0.18**	-0.21***	-0.32***	-0.40***
	(0.07)	(0.08)	(0.09)	(0.08)
R-squared	0.06	0.07	0.08	0.11
Adjusted R-squared	0.05	0.06	0.06	0.08

Notes. Linear Probability Regressions. N=365. Dependent Variable: Voting for/against prior attitude [-1 changed to rejection, 0 did not change, 1 changed to acceptance]. Model 1 contains the distribution procedures; omitted category: Equal distribution. Model 2 includes the main effects of the treatments redistribution and effort. Model 3 includes all two-way interactions of the treatments redistribution and effort with the proposed distribution procedures. Model adds all three-way interaction effects. Robust standard errors that took the clustered structure of the data in account are in parentheses. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.[24]

[24] The same regression model was also calculated with the omitted group (see FN 4) and also with control for the sociodemographic variables gender (male, female), age (in years), main subject of studies (economical or not), having experience with being jobless, working or not, and income (4 categories: under 400 Euro, 400-699.99 Euro, 700-99.99 Euro, above 1000 Euro). No qualitative differences were found between the models.

Table 22: Attitude changes – marginal effects of deliberation effects

		Influence of	dy/dx	Std. Err	t	Sig	Conf-	Conf+
Equal Distribution	Lottery	Redistribution	0.23	0.16	1.45	0.151	-0.09	0.54
	Effort	Redistribution	-0.07	0.19	-0.34	0.732	-0.45	0.32
	Distribution	Effort	0.37	0.16	2.36	0.021	0.06	0.68
	Redistribution	Effort	0.07	0.20	0.37	0.716	-0.32	0.46
Weaker First	Lottery	Redistribution	-0.08	0.05	-1.45	0.152	-0.18	0.03
	Effort	Redistribution	-0.17	0.15	-1.10	0.274	-0.47	0.13
	Distribution	Effort	0.07	0.07	0.95	0.344	-0.07	0.21
	Redistribution	Effort	-0.02	0.14	-0.17	0.869	-0.31	0.26
Mixed	Lottery	Redistribution	-0.33	0.10	-3.20	0.002	-0.54	-0.13
	Effort	Redistribution	0.20	0.14	1.40	0.167	-0.09	0.49
	Distribution	Effort	-0.17	0.13	-1.30	0.198	-0.42	0.09
	Redistribution	Effort	0.37	0.12	3.00	0.004	0.12	0.61

Notes. Marginal Effects depending on Model 4 of the linear probability models in Table 21.

Proposed Alternative Distributions

Tobit Regression

Table 23: Suggestions for alternative distributions – tobit regressions

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Receiving Member 1	3.31***	3.31***	5.34***	5.71***
	(0.25)	(0.25)	(0.36)	(0.37)
Receiving Member 2	1.16***	1.16***	1.92***	2.12***
	(0.15)	(0.15)	(0.17)	(0.14)
Receiving Member 4	-1.46***	-1.46***	-2.44***	-2.86***
	(0.20)	(0.20)	(0.35)	(0.43)
Receiving Member 5	-2.11***	-2.12***	-3.13***	-3.27***
	(0.23)	(0.23)	(0.48)	(0.62)
Redistribution		0.20***	0.67***	0.81**
		(0.04)	(0.21)	(0.33)
Effort		0.16***	0.09	0.24
		(0.03)	(0.21)	(0.25)
Receiving Member 1*Redistribution			-2.60***	-3.35***
			(0.50)	(0.75)
Receiving Member 2*Redistribution			-1.01***	-1.41***
			(0.30)	(0.47)
Receiving Member 4*Redistribution			0.67	1.44**
			(0.41)	(0.60)
Receiving Member 5*Redistribution			0.80*	1.05
			(0.46)	(0.79)
Receiving Member 1*Effort			-1.41***	-2.23***
			(0.50)	(0.67)
Receiving Member 2*Effort			-0.49	-0.93***
			(0.30)	(0.35)
Receiving Member 4* Effort			1.26***	2.10***
			(0.43)	(0.74)
Receiving Member 5* Effort			1.19**	1.46*
			(0.47)	(0.75)
Redistribution*Effort				-0.29
				(0.40)
Receiving Memb. 1*Redistribution*Effort				1.56
				(1.00)
Receiving Memb. 2*Redistribution*Effort				0.84
				(0.60)
Receiving Memb. 4*Redistribution*Effort				-1.53*
				(0.87)
Receiving Memb. 5*Redistribution*Effort				-0.48
				(0.95)
Constant	3.61***	3.43***	3.22***	3.15***
	(0.10)	(0.11)	(0.14)	(0.13)
Sigma	2.61***	2.61***	2.49***	2.48***
	(0.18)	(0.18)	(0.19)	(0.19)

Notes. Tobit regressions. Lower limit: 0; upper limit: 20. N = 1150. Design df = 45. Dependent Variable: Suggested allocation of token to the group member. Model 1 contains the rank of the receiving member [0-4]. Model 2 includes the redistribution treatment and the effort treatment. Model 3 includes 2-way-interactions between the rank of the receiving members and the redistribution and effort treatment. Model 4 includes all 3-way-interactions between the variables. Standard errors in parantheses took the clustered structure of the data in account. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.[25]

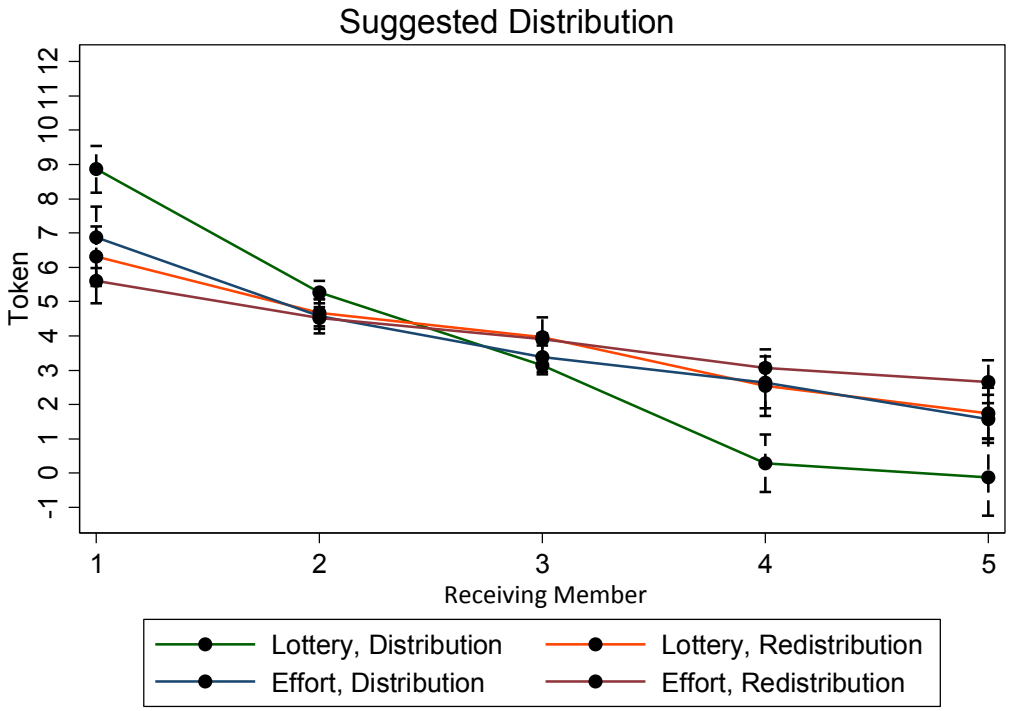
[25] The same regression model was also calculated with the omitted group (see FN 4) and also with control for the sociodemographic variables gender (male, female), age (in years), main subject of studies (economical or not), having experience with being jobless, working or not, and income (4 categories: under 400 Euro, 400-699.99 Euro, 700-99.99 Euro, above 1000 Euro). No qualitative differences were found between the models.

Table 24: Suggestions for alternative distributions – margins for tobit regression

	Margin	Std. Err	t	sig	Conf-	Conf+
Receiving Member 1						
Lottery*Distribution	8.86	0.26	34.72	0.000	8.35	9.38
Lottery*Redistribution	6.32	0.27	23.83	0.000	5.79	6.86
Effort*Distribution	6.88	0.37	18.44	0.000	6.12	7.63
Effort*Redistribution	5.61	0.25	22.81	0.000	5.11	6.10
Receiving Member 2						
Lottery*Distribution	5.28	0.13	39.23	0.000	5.00	5.55
Lottery*Redistribution	4.67	0.09	53.03	0.000	4.49	4.85
Effort*Distribution	4.58	0.19	24.66	0.000	4.21	4.96
Effort*Redistribution	4.53	0.10	45.11	0.000	4.33	4.73
Receiving Member 3						
Lottery*Distribution	3.15	0.09	35.86	0.000	2.97	3.33
Lottery*Redistribution	3.96	0.15	25.71	0.000	3.65	4.27
Effort*Distribution	3.39	0.16	20.98	0.000	3.06	3.71
Effort*Redistribution	3.91	0.09	43.9	0.000	3.73	4.09
Receiving Member 4						
Lottery*Distribution	0.30	0.39	0.76	0.450	-0.49	1.08
Lottery*Redistribution	2.54	0.26	9.9	0.000	2.02	3.06
Effort*Distribution	2.64	0.25	10.66	0.000	2.14	3.14
Effort*Redistribution	3.06	0.12	24.52	0.000	2.81	3.31
Receiving Member 5						
Lottery*Distribution	-0.12	0.42	-0.28	0.779	-0.97	0.73
Lottery*Redistribution	1.74	0.28	6.13	0.000	1.17	2.31
Effort*Distribution	1.58	0.42	3.76	0.000	0.73	2.43
Effort*Redistribution	2.67	0.19	13.94	0.000	2.28	3.05

Notes. Margins for Model 4 of the tobit regressions in Table.

Figure 6: Suggested distributions – predicted allocations (tobit)



Notes. Figure is derived from model 4 of the tobit regression model in Table 23 and its margins in Table 24. Confidence intervals: 95%.[26]

Table 25: Suggestions for alternative distributions – marginal effects for tobit regression

Member		Influence of	dy/dx	Std. Err	t	sig	Conf-	Conf+
1	Lottery	Redistribution	-2.54	0.56	-4.55	0.000	-3.64	-1.44
	Effort	Redistribution	-1.27	0.56	-2.26	0.025	-2.37	-0.16
	Distribution	Effort	-1.99	0.57	-3.49	0.001	-3.11	-0.86
	Redistribution	Effort	-0.72	0.55	-1.31	0.193	-1.80	0.37
2	Lottery	Redistribution	-0.61	0.26	-2.35	0.020	-1.12	-0.10
	Effort	Redistribution	-0.05	0.30	-0.18	0.861	-0.65	0.54
	Distribution	Effort	-0.69	0.30	-2.29	0.023	-1.29	-0.10
	Redistribution	Effort	-0.14	0.26	-0.54	0.587	-0.65	0.37
3	Lottery	Redistribution	0.81	0.33	2.44	0.016	0.15	1.46
	Effort	Redistribution	0.52	0.24	2.18	0.031	0.05	0.99
	Distribution	Effort	0.24	0.25	0.94	0.349	-0.26	0.74
	Redistribution	Effort	-0.05	0.31	-0.16	0.873	-0.67	0.57
4	Lottery	Redistribution	2.24	0.54	4.15	0.000	1.18	3.31
	Effort	Redistribution	0.42	0.52	0.81	0.417	-0.60	1.45
	Distribution	Effort	2.34	0.68	3.47	0.001	1.01	3.67
	Redistribution	Effort	0.52	0.37	1.42	0.159	-0.21	1.25
5	Lottery	Redistribution	1.86	0.69	2.67	0.008	0.49	3.23
	Effort	Redistribution	1.09	0.47	2.30	0.023	0.15	2.02
	Distribution	Effort	1.70	0.68	2.49	0.014	0.35	3.05
	Redistribution	Effort	0.93	0.49	1.90	0.060	-0.04	1.90

Notes. Marginal effects for tobit regression Model 4 in Table 23.

[26] Please note that the variable on the x-axis is ordinal scaled. Hence, the lines between the receiving members depict only the difference between the suggested allocations.

OLS Regression

Table 26: Suggestion for alternative distributions – OLS regressions

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Receiving Member 1	3.32***	3.32***	5.31***	5.68***
	(0.24)	(0.24)	(0.35)	(0.37)
Receiving Member 2	1.15***	1.15***	1.90***	2.10***
	(0.14)	(0.14)	(0.17)	(0.14)
Receiving Member 4	-1.13***	-1.13***	-1.63***	-1.83***
	(0.17)	(0.17)	(0.27)	(0.29)
Receiving Member 5	-1.53***	-1.53***	-1.93***	-1.90***
	(0.19)	(0.19)	(0.36)	(0.44)
Redistribution			0.60***	0.76**
			(0.19)	(0.31)
Effort			0.11	0.29
			(0.19)	(0.21)
Receiving Member 1*Redistribution			-2.51***	-3.26***
			(0.49)	(0.73)
Receiving Member 2*Redistribution			-0.95***	-1.35***
			(0.28)	(0.44)
Receiving Member 4*Redistribution			0.26	0.66
			(0.36)	(0.49)
Receiving Member 5*Redistribution			0.21	0.15
			(0.37)	(0.61)
Receiving Member 1*Effort			-1.42***	-2.24***
			(0.49)	(0.65)
Receiving Member 2*Effort			-0.52*	-0.96***
			(0.29)	(0.33)
Receiving Member 4* Effort			0.77**	1.21**
			(0.35)	(0.57)
Receiving Member 5* Effort			0.60	0.54
			(0.36)	(0.52)
Redistribution*Effort				-0.33
				(0.37)
Receiving Member 1*Redistribution*Effort				1.56
				(0.97)
Receiving Member 2*Redistribution*Effort				0.83
				(0.56)
Receiving Member 4*Redistribution*Effort				-0.84
				(0.71)
Receiving Member 5*Redistribution*Effort				0.12
				(0.73)
Constant	3.64***	3.64***	3.27***	3.19***
	(0.09)	(0.09)	(0.12)	(0.11)
R-squared	0.37	0.37	0.42	0.43

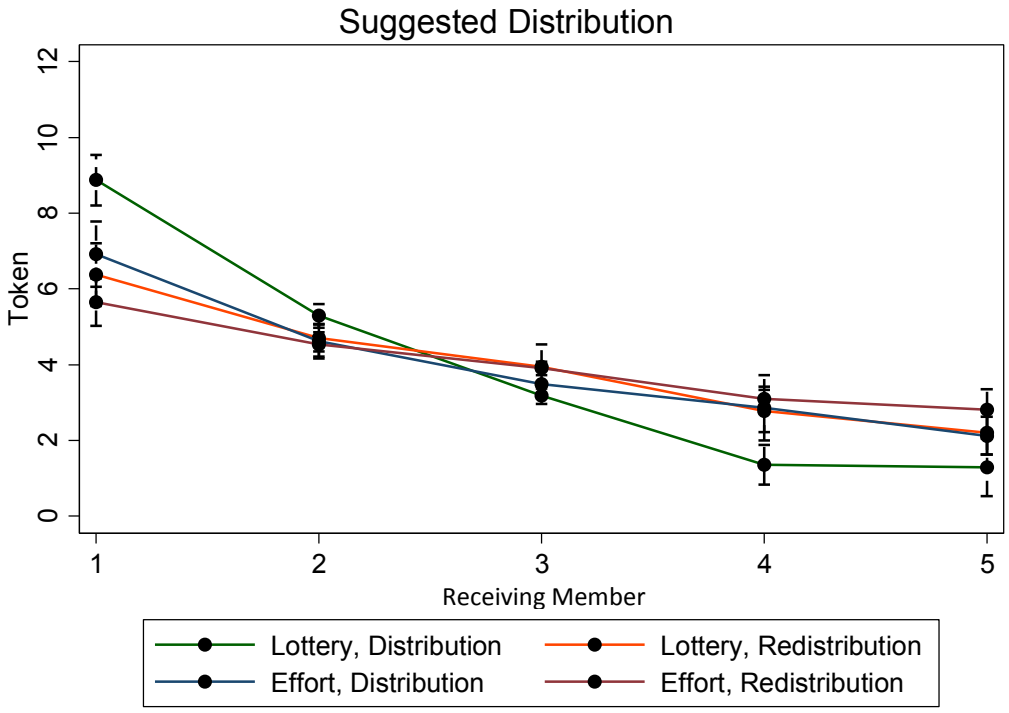
Notes. OLS Regressions. N = 1150. Design df = 45. Dependent Variable: Suggested allocation of token to the group members. Model 1 contains the rank of the receiving member [0-4]. Model 2 includes the main effects of the redistribution treatment and the effort treatments. Model 3 includes all 2-way interactions and Model 4 contains all 3-way interactions. Standard errors in parantheses took the clustered structure of the data in account. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Table 27: Suggestion for alternative distributions – margins for OLS regression

	Margin	Std. Err	t	sig	Conf-	Conf+
Receiving Member 1						
Lottery*Distribution	8.87	0.34	26.12	0.000	8.20	9.54
Lottery*Redistribution	6.38	0.42	15.11	0.000	5.54	7.21
Effort*Distribution	6.92	0.44	15.82	0.000	6.06	7.78
Effort*Redistribution	5.65	0.32	17.89	0.000	5.03	6.27
Receiving Member 2						
Lottery*Distribution	5.29	0.16	33.86	0.000	4.98	5.60
Lottery*Redistribution	4.70	0.18	26.02	0.000	4.34	5.06
Effort*Distribution	4.62	0.23	19.77	0.000	4.16	5.08
Effort*Redistribution	4.53	0.16	28.07	0.000	4.21	4.85
Receiving Member 3						
Lottery*Distribution	3.19	0.11	28.64	0.000	2.97	3.41
Lottery*Redistribution	3.95	0.29	13.45	0.000	3.37	4.53
Effort*Distribution	3.48	0.18	19.33	0.000	3.12	3.84
Effort*Redistribution	3.91	0.09	42.95	0.000	3.73	4.09
Receiving Member 4						
Lottery*Distribution	1.36	0.27	5.03	0.000	0.82	1.89
Lottery*Redistribution	2.78	0.28	9.85	0.000	2.22	3.33
Effort*Distribution	2.86	0.43	6.60	0.000	2.01	3.71
Effort*Redistribution	3.10	0.16	19.41	0.000	2.79	3.42
Receiving Member 5						
Lottery*Distribution	1.29	0.38	3.37	0.001	0.54	2.04
Lottery*Redistribution	2.20	0.29	7.58	0.000	1.63	2.77
Effort*Distribution	2.12	0.25	8.34	0.000	1.62	2.62
Effort*Redistribution	2.82	0.27	10.25	0.000	2.27	3.36

Notes. Margins for Model 4 of the OLS regressions in Table 26.

Figure 7: Suggested distributions – predicted allocations (OLS)



Notes. Figure is derived from model 4 of the OLS regression in Table 26 and its margins in Table 27. Confidence intervals: 95%.

Table 28: Suggestion for alternative distributions – marginal effects for OLS regression

Member		Influence of	dy/dx	Std. Err	t	sig	Conf-	Conf+
1	Lottery	Redistribution	-2.50	0.54	-4.61	0.000	-3.57	-1.43
	Effort	Redistribution	-1.27	0.54	-2.35	0.020	-2.33	-0.21
	Distribution	Effort	-1.95	0.55	-3.53	0.001	-3.05	-0.86
	Redistribution	Effort	-0.73	0.53	-1.38	0.171	-1.76	0.31
2	Lottery	Redistribution	-0.59	0.24	-2.47	0.014	-1.06	-0.12
	Effort	Redistribution	-0.09	0.28	-0.32	0.747	-0.65	0.47
	Distribution	Effort	-0.67	0.28	-2.38	0.018	-1.22	-0.12
	Redistribution	Effort	-0.17	0.24	-0.71	0.479	-0.65	0.31
3	Lottery	Redistribution	0.76	0.31	2.42	0.017	0.14	1.38
	Effort	Redistribution	0.43	0.20	2.11	0.036	0.03	0.82
	Distribution	Effort	0.29	0.21	1.37	0.172	-0.13	0.71
	Redistribution	Effort	-0.04	0.31	-0.14	0.886	-0.65	0.56
4	Lottery	Redistribution	1.42	0.39	3.64	0.000	0.65	2.19
	Effort	Redistribution	0.24	0.46	0.52	0.603	-0.67	1.15
	Distribution	Effort	1.50	0.51	2.95	0.004	0.50	2.51
	Redistribution	Effort	0.33	0.32	1.01	0.316	-0.31	0.96
5	Lottery	Redistribution	0.91	0.48	1.90	0.060	-0.04	1.86
	Effort	Redistribution	0.70	0.37	1.86	0.065	-0.04	1.43
	Distribution	Effort	0.83	0.46	1.81	0.072	-0.08	1.74
	Redistribution	Effort	0.62	0.40	1.54	0.125	-0.17	1.40

Notes. Marginal effects for Model 4 of the OLS regressions in Table 26.

Alternative Distributions

Tobit Regression

Table 29: Chosen alternative distributions – tobit regressions

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Receiving Member 1	3.66***	3.66***	6.02***	6.17***
	(0.35)	(0.35)	(0.47)	(0.49)
Receiving Member 2	1.35***	1.35***	2.13***	2.33***
	(0.16)	(0.16)	(0.21)	(0.18)
Receiving Member 4	-1.96***	-1.97***	-3.26***	-3.64***
	(0.16)	(0.16)	(0.28)	(0.39)
Receiving Member 5	-3.10***	-3.12***	-4.35***	-4.76***
	(0.20)	(0.21)	(0.37)	(0.55)
Redistribution		0.19***	0.39**	0.42***
		(0.04)	(0.15)	(0.15)
Effort		0.19***	0.36**	0.38
		(0.04)	(0.15)	(0.27)
Receiving Member 1*Redistribution			-2.42***	-2.70***
			(0.64)	(0.79)
Receiving Member 2*Redistribution			-0.34	-0.75***
			(0.33)	(0.26)
Receiving Member 4*Redistribution			1.13***	1.82***
			(0.28)	(0.46)
Receiving Member 5*Redistribution			0.83*	1.52**
			(0.42)	(0.68)
Receiving Member 1*Effort			-2.30***	-2.61**
			(0.64)	(1.04)
Receiving Member 2*Effort			-1.24***	-1.70**
			(0.32)	(0.63)
Receiving Member 4* Effort			1.42***	2.16***
			(0.28)	(0.52)
Receiving Member 5* Effort			1.59***	2.31***
			(0.42)	(0.74)
Redistribution*Effort				-0.05
				(0.30)
Receiving Member 1*Redistribution*Effort				0.60
				(1.29)
Receiving Member 2*Redistribution*Effort				0.86
				(0.67)
Receiving Member 4*Redistribution*Effort				-1.33**
				(0.59)
Receiving Member 5*Redistribution*Effort				-1.24
				(0.89)
Constant	3.80***	3.61***	3.43***	3.42***
	(0.07)	(0.08)	(0.11)	(0.11)
Sigma	2.13***	2.13***	1.90***	1.89***
	(0.16)	(0.16)	(0.16)	(0.15)

Notes. Tobit regressions. Lower limit: 0; upper limit: 20. N = 1150. Design df = 45. Dependent Variable: Chosen allocation of token to the group member in question. Model 1 contains the rank of the receiving member [0-4]. Model 2 includes the main effects of the redistribution treatment and the effort treatment. Model 3 includes all 2-way interactions and Model 4 contains all 3-way interactions. Standard errors in parantheses took the clustered structure of the data in account. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Table 30: Chosen alternative distributions – margins for tobit regression

	Margin	Std. Err	t	sig	Conf-	Conf+
Receiving Member 1						
Lottery*Distribution	9.58	0.39	24.37	0.000	8.79	10.38
Lottery*Redistribution	7.30	0.54	13.53	0.000	6.21	8.38
Effort*Distribution	7.36	0.71	10.35	0.000	5.93	8.79
Effort*Redistribution	5.62	0.38	14.65	0.000	4.85	6.39
Receiving Member 2						
Lottery*Distribution	5.75	0.11	54.43	0.000	5.54	5.96
Lottery*Redistribution	5.42	0.11	47.68	0.000	5.19	5.65
Effort*Distribution	4.44	0.41	10.82	0.000	3.61	5.26
Effort*Redistribution	4.92	0.09	56.19	0.000	4.74	5.09
Receiving Member 3						
Lottery*Distribution	3.42	0.11	30.07	0.000	3.19	3.65
Lottery*Redistribution	3.83	0.10	39.07	0.000	3.64	4.03
Effort*Distribution	3.80	0.24	15.65	0.000	3.31	4.29
Effort*Redistribution	4.17	0.10	42.47	0.000	3.97	4.36
Receiving Member 4						
Lottery*Distribution	-0.23	0.48	-0.47	0.639	-1.19	0.74
Lottery*Redistribution	2.01	0.31	6.38	0.000	1.37	2.64
Effort*Distribution	2.32	0.45	5.21	0.000	1.42	3.21
Effort*Redistribution	3.17	0.14	22.32	0.000	2.88	3.45
Receiving Member 5						
Lottery*Distribution	-1.34	0.58	-2.32	0.025	-2.50	-0.18
Lottery*Redistribution	0.60	0.45	1.34	0.187	-0.30	1.49
Effort*Distribution	1.36	0.54	2.52	0.015	0.27	2.44
Effort*Redistribution	2.00	0.27	7.32	0.000	1.45	2.55

Notes. Margins for Model 4 of the tobit regressions in Table 29.

OLS Regression

Table 31: Chosen alternative distributions – OLS regressions

	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Receiving Member 1	3.70***	3.70***	6.03***	6.17***
	(0.34)	(0.34)	(0.46)	(0.49)
Receiving Member 2	1.37***	1.37***	2.14***	2.33***
	(0.16)	(0.16)	(0.20)	(0.18)
Receiving Member 4	-1.65***	-1.65***	-2.44***	-2.58***
	(0.11)	(0.11)	(0.16)	(0.17)
Receiving Member 5	-2.43***	-2.43***	-2.88***	-3.00***
	(0.13)	(0.13)	(0.19)	(0.19)
Redistribution			0.39**	0.42***
			(0.15)	(0.15)
Effort			0.36**	0.38
			(0.15)	(0.27)
Receiving Member 1*Redistribution			-2.40***	-2.67***
			(0.62)	(0.78)
Receiving Member 2*Redistribution			-0.37	-0.75***
			(0.31)	(0.26)
Receiving Member 4*Redistribution			0.62***	0.92***
			(0.20)	(0.26)
Receiving Member 5*Redistribution			0.18	0.42
			(0.26)	(0.30)
Receiving Member 1*Effort			-2.27***	-2.57**
			(0.62)	(1.02)
Receiving Member 2*Effort			-1.21***	-1.63***
			(0.31)	(0.59)
Receiving Member 4* Effort			0.96***	1.28***
			(0.20)	(0.31)
Receiving Member 5* Effort			0.74***	1.00**
			(0.26)	(0.39)
Redistribution*Effort				-0.05
				(0.30)
Redistribution*Effort				0.57
				(1.25)
Receiving Member 1*Redistribution*Effort				0.80
				(0.63)
Receiving Member 2*Redistribution*Effort				-0.62
				(0.40)
Receiving Member 4*Redistribution*Effort				-0.50
				(0.53)
Constant	3.80***	3.80***	3.43***	3.42***
	(0.07)	(0.07)	(0.11)	(0.11)
R-squared	0.58	0.58	0.67	0.67

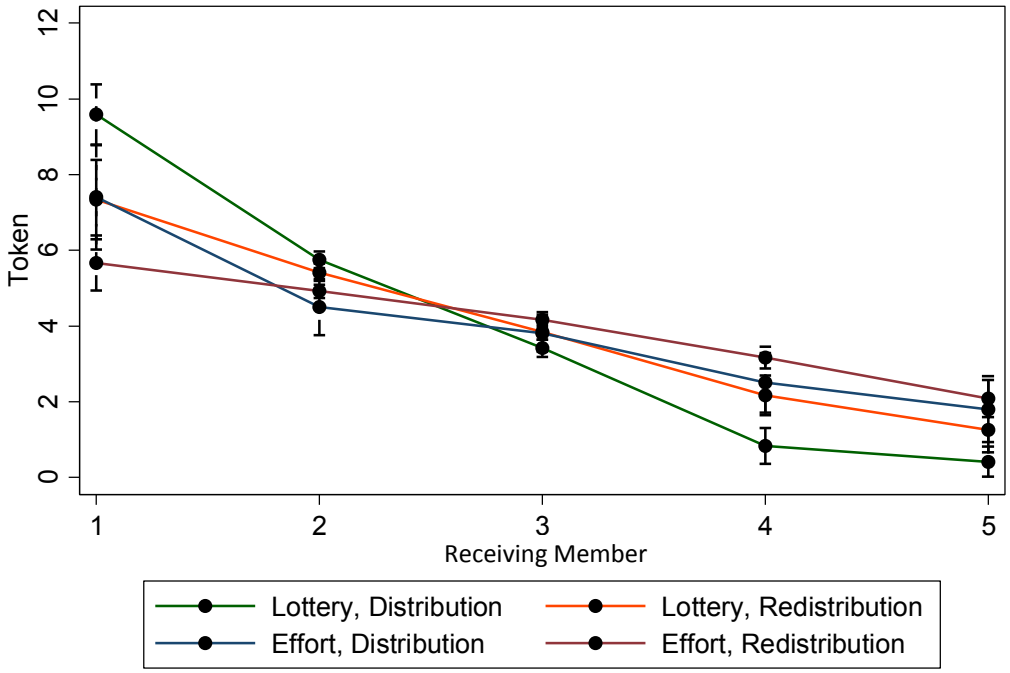
Notes. OLS Regressions. N = 1150. Design df = 45. Dependent Variable: Chosen allocation of token to the group member in question. Model 1 contains the rank of the receiving member [0-4]. Model 2 includes the main effects of the redistribution treatment and the effort treatments. Model 3 includes all 2-way interactions and Model 4 contains all 3-way interactions. Standard errors in parentheses took the clustered structure of the data in account. *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Table 32: Chosen alternative distributions – margins for OLS regression

	Margin	Std. Err	t	sig	Conf-	Conf+
Receiving Member 1						
Lottery*Distribution	9.58	0.39	24.37	0.000	8.79	10.38
Lottery*Redistribution	7.33	0.52	14.12	0.000	6.29	8.38
Effort*Distribution	7.40	0.69	10.79	0.000	6.02	8.78
Effort*Redistribution	5.67	0.36	15.85	0.000	4.95	6.39
Receiving Member 2						
Lottery*Distribution	5.75	0.11	54.43	0.000	5.54	5.96
Lottery*Redistribution	5.42	0.11	47.67	0.000	5.19	5.65
Effort*Distribution	4.50	0.37	12.11	0.000	3.75	5.25
Effort*Redistribution	4.92	0.09	56.18	0.000	4.74	5.09
Receiving Member 3						
Lottery*Distribution	3.42	0.11	30.07	0.000	3.19	3.65
Lottery*Redistribution	3.83	0.10	39.07	0.000	3.64	4.03
Effort*Distribution	3.80	0.24	15.65	0.000	3.31	4.29
Effort*Redistribution	4.17	0.10	42.47	0.000	3.97	4.36
Receiving Member 4						
Lottery*Distribution	0.83	0.24	3.49	0.001	0.35	1.31
Lottery*Redistribution	2.17	0.26	8.35	0.000	1.64	2.69
Effort*Distribution	2.50	0.39	6.39	0.000	1.71	3.29
Effort*Redistribution	3.17	0.14	22.32	0.000	2.88	3.45
Receiving Member 5						
Lottery*Distribution	0.42	0.20	2.11	0.041	0.02	0.82
Lottery*Redistribution	1.25	0.29	4.30	0.000	0.66	1.84
Effort*Distribution	1.80	0.43	4.16	0.000	0.93	2.67
Effort*Redistribution	2.08	0.25	8.49	0.000	1.59	2.58

Notes. Margins for Model 4 of the OLS regressions in Table 31.

Figure 8: Chosen distributions – predicted allocations (OLS)



Notes. Graph is depicted of regression Model 4 in Table 31 and its margins in Table 27. Confidence intervals: 95%.[27]

[27] Please note that the variable on the x-axis is ordinal scaled. Hence, the lines between the receiving members depict only the difference between the *chosen* allocations.

DFG Research Group 2104
– Latest Contributions

2017:

Pritzlaff-Scheele, Tanja and Zauchner, Patricia: Meeting Needs. An Experimental Study on Need-Based Justice and Inequality. Working Paper Nr. 2017-07. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-07.pdf

Paetzel, Fabian, Lorenz, Jan and Tepe, Markus: Transparency diminishes framing-effects in voting on redistribution: Some experimental evidence. Working Paper Nr. 2017-06.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-06.pdf

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

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