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The Anatomy of Distributional Preferences with Group Identity

Daniel Muller*

February 2, 2017

Abstract

This paper dissects distributional preferences with group identity in a modified dictator game. I estimate individual-level utility functions with two parameters that govern the trade-offs between equity and efficiency and giving to *self* and to *other*. Subjects put on average less weight on income of the out-group, but overall only a minority behaves completely selfishly. Giving to the out-group also renders subjects more accepting of inequality. However, the experiment also uncovers a large heterogeneity of preferences. It seems that those who are social become slightly less social in the presence of the out-group. The number of selfish individuals is instead hardly affected. Moreover, choices in both treatments overwhelmingly stem from well-behaved, yet systematically different underlying social preference functionals. Hence this experiment suggests that the rational choice approach, which is predominantly used in the literature, is a useful tool to understand the effect of group identity on social preferences. As a side result, I find that the weight on *self*, but not the individual equity-efficiency trade-off, predicts political left-right self-assessment as more conservative voters are more selfish. I also document gender differences: females put less weight on *self*, are more inequality averse and react more strongly to the treatment.

Keywords: Social identity, GARP, distributional preferences.
JEL classification: D30, D63, H50.

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1 Introduction

Determinants and consequences of inequality have recently attracted great attention from economists and the general public alike. The distributional preferences of voters are an important factor in shaping economic outcomes. Therefore, it is necessary to study these preferences to understand inequality in democratic societies. At the same time, there is accumulating evidence showing that, in various contexts, people care about the social group they are part of in economically relevant ways.[1] This in turn influences redistribution in a society. Thus, the effect of group identity on distributional preferences is important for at least two reasons. Firstly, to comprehend economic policies in heterogeneous societies and secondly, to juxtapose political and economic outcomes in heterogeneous and more homogeneous societies. As argued by Alesina, Glaeser, and Sacerdote (2001), social heterogeneity might be one of the main underlying causes of the small US-American welfare state relative to continental European countries.

In this paper, I study the causal impact of group identity on distributional preferences. I gather a rich dataset in a controlled laboratory environment in which subjects make repeated allocative decisions with linear budgets on how to distribute money between *self* and *other*. The experimental design draws on a graphical representation of allocations in which subjects indicate their preferred allocation by clicking on a budget set. This design allows for the eliciting of many allocative choices per subject with varying prices for giving (different slopes of the budget set).[2] The treatment varies whether the recipient is from the in–group or from the out–group. I exogenously induce group identity using preferences over Klee and Kandinsky paintings. This inducement mechanism is purposefully designed to be as meaningless as possible and has the great advantage of tight control over the concept of identity that field studies usually do not allow.

Consequently, this paper makes two important contributions. First, the experiment answers the question whether distributional preferences with group identity can best be understood using a rational choice approach - the most prominent approach in the economics literature (Akerlof and Kranton, 2000; Chen and Li, 2009); or whether it makes more sense to think of them as framing effect, mistakes or heuristics. While economists typically think of choices as stemming from some sort of maximization behavior, social psychologists often (implicitly) assume that group identity works as a framing device (Tajfel, 1981). This means, according to this approach, feelings of group identity are essentially a cognitive bias.

Like Andreoni and Miller (2002), I treat giving to *self* and to *other* as two different goods.[3]

[1] See for example Chen and Li (2009), Charness, Rigotti, and Rustichini (2007), Goette, Huffman, and Meier (2006) and Bernhard, Fehr, and Fischbacher (2006).

[2] This design was introduced by Fisman, Kariv, and Markovits (2007) and Choi, Fisman, Gale, and Kariv (2007) in a different context.

[3] See also Sippel (1997) and Harbaugh, Krause, and Berry (2001).

The Generalized Axiom of Revealed Preferences (GARP) then provides a criterion to judge whether the choice data with linear budgets can be rationalized by well–behaved (continuous, convex and monotonic) utility functions. In particular, if the data satisfy GARP, there exists a utility function that can rationalize the data (Afriat, 1967). Since people are prone to errors and choice data either satisfy GARP or not, a continuous measure of the severity of GARP violations is desirable. Afriat's (1972) Critical Cost Efficiency Index (CCEI) provides such an index. It measures the minimum degree each budget line has to be shifted to remove all GARP violations and consequently lies between zero and one. A CCEI score equal to one means the choice data do not exhibit any GARP violations. Intriguingly, subjects in my experiment display very high CCEI scores with an average of more than 0.95. Hence, the data suggests choices in both treatments overwhelmingly stem from well-behaved, yet systematically different underlying social preferences.

Second, given the GARP analysis suggests most choices stem from maximization behavior, I continue by estimating *individual-level* distributional preference with induced group identity. This approach allows me to study the causal impact of group identity on distributional preferences at the subject-level. Estimates of social preferences with group identity are so far, for statistical reasons, based on pooled estimations that are likely to mask a wide array of different individual behaviors. Several studies have recently found strong evidence for individual heterogeneity.[4] I document considerable heterogeneity in distributional preferences in the presence of social groups. I estimate constant elasticity of substitution (CES) utility functions that decompose distributional preferences into the weight on the recipient's income relative to the own income and into an equity-efficiency trade-off. This exercise delivers several important insights. First, most people are mildly social and relatively efficiency-minded. Second, subjects put, on average, less weight on income of the out-group. Third, the distribution of individual equity-efficiency trade-offs is also affected. In particular, the treatment changes the tails of the distribution as the variance of the data-generating process decreases in the out-group treatment. The *average* treatment effect on efficiency-mindedness (inequality aversion) is however comparatively small: subjects become slightly more tolerant of inequality when dealing with the out-group. The data however also document heterogeneous treatment effects. It seems that the out-group treatment does not change the number of selfish individuals, instead those who are social become less social when dealing with the out-group. Hence, looking at the average not only neglects large individual differences, but also tends to underestimate the impact of the treatment. These findings can be taken as evidence that the common approach of treating preferences as homogeneous and therefore pooling data in empirical estimations is likely misguided.

Several interesting pieces of evidence suggest the parameters of the CES utility function and the

[4]See Harrison and Rutström (2009) and Choi, Fisman, Gale, and Kariv (2007) for studies on risk preferences and Fisman, Kariv, and Markovits (2007); Cappelen, Hole, Sørensen, and Tungodden (2007) for studies that show heterogeneity in social or fairness preferences.

CCEI scores are meaningful in capturing behavior outside the laboratory. First, Fisman, Jakiela, and Kariv (2015) in a representative sample show the individual equity-efficiency trade-off predicts the political decisions of Americans. They show this in the sense that subjects who voted for the Democrats are more inequality-averse than Republican voters, but are not more or less selfish. Second, Fisman, Jakiela, Kariv, and Markovits (2015) show that this very same parameter predicts subsequent career choices of Yale Law School students: those who were relatively more efficiency-minded were later on more likely to choose to work in the private sector after graduation. Higher inequality-aversion in their experiment on the other hand, went along with a higher propensity to search for employment in the non-profit sector. Lastly, Choi et al. (2014) present evidence suggesting the degree of rationality in a risky decision-making experiment has substantial external validity as a measure for decision-making quality. They find CCEI scores predict accumulated wealth in a representative sample of the Dutch population.

As an interesting side result, I find that in my sample of students at a German university it is the degree of selfishness and not the equity-efficiency trade-off (as in Fisman, Jakiela, and Kariv (2015) for an American sample) that predicts self-placement on a political left–right scale. People who classify themselves as more right–leaning behave more selfishly in the experiment. This finding hints at deeper underlying ideological differences in the political system in Continental European countries and the United States.[5] Additionally, the data reveal gender effects across both treatments. Females are slightly less selfish, significantly more inequality averse and react more strongly to the manipulation of group identity. I do not find any evidence that the treatment effect depends on the political orientation of the subjects.

This paper proceeds as follows. Section 2 relates the current paper to the literature, while Section 3 depicts the experiment in more detail. Section 4 discusses the concept of rationality used here and presents the corresponding empirical results from this experiment. Section 5 describes individual-level distributional preferences with group identity and Section 6 assesses the connection to political preferences and potential gender effects. Finally, Section 7 concludes.

2 Relation to the Literature

The notion of identity - "a person's sense of self" - has recently gained much attention in economics. This interest has been triggered mainly by the work of Akerlof and Kranton (2000) although the concept has been important in social psychology for much longer.[6] The literature to date offers

[5] Of course, these differences might also be driven by the fundamentally different research designs of the current study.

[6] See Tajfel, Billig, Bundy, and Flament (1971); Tajfel and Turner (1979).

considerable evidence that social identity can impact preferences and political behavior.[7] Early empirical evidence about the nexus of race and preferences for redistribution goes at least back to Orr (1976). More recently, Luttmer (2001) employed survey data to show preferences for welfare spending are also determined by the racial composition of local welfare recipients. Enos (2016) shows that the presence of a black minority affected turnout of whites in Chicago and simultaneously increased the vote share for conservatives. Looking at Sweden, Eger (2009) finds evidence that the amount of immigration decreases support for the welfare state. The papers by Fong and Luttmer (2009), Klor and Shayo (2010) and Fong and Luttmer (2011) provide evidence for political-economic consequences of social heterogeneity using lab and survey experiments. All three works suggest an increase in social heterogeneity will lead to less redistribution.

Because of the apparent empirical difficulties to measure the influence of social identity, many researchers have turned to laboratory experiments, which allow for tight control over the notion of identity. Group membership is usually induced via preferences over Klee and Kandinsky paintings thus creating groups that are supposedly as meaningless as possible such that group characteristics are orthogonal to the variable of interest. In an influential paper, Chen and Li (2009) study the effect of group identity on social preferences using this procedure. Because they use a variety of different economic games, the number of dictator game choices they elicit is limited. They conclude that people are "more altruistic" to members of their own group.[8]

Group identity also plays an important role in other contexts. Landa and Duell (2015), for example, show in a laboratory experiment that social identity can affect the relationship between politicians and voters in systematic ways. In particular, politicians from the same group are re-elected to office despite a poorer performance than politicians who do not share a group identity with their voters. Grosskopf and Pearce (2016) use *other-other* and *self-other* allocations games in the field in order to study discrimination against Muslims. Interestingly, they find discrimination is not the result of in-group favoritism but of out-group negativity.

There are three papers directly related to my experiment. First, Porter and Adams (2015) conduct a dictator game to study motives for inter-generational transfers. Their experiment manipulates whether the recipient is a stranger or a parent of the participants. Their experimental design allows them to estimate CCEI scores and utility functions *at the treatment-level*. Their ex-

[7] For the sake of brevity, I do not attempt to review the complete literature. Please see Stichnoth and Van der Straeten (2013) and Costa-Font and Cowell (2015) instead for (non-experimental) surveys on the impact of ethnic diversity on redistributive spending.

[8] Other influential experimental papers on identity are Bernhard, Fehr, and Fischbacher (2006) and Goette, Huffman, and Meier (2006) who study third party norm enforcement and cooperation with induced and natural groups and Charness, Rigotti, and Rustichini (2007) who study a battle of the sexes game and the prisoner's dilemma. For more recent experimental studies on group identity see for example Hett, Kröll, and Mechtel (2016) and Paetzel and Sausgruber (2016).

periment also includes an experimental manipulation as to whether the recipient is informed about potential transfers.

As the authors are seeking to answer different research questions, their experiment does not therefore answer the question of what the causal impact of group identity on distributional preferences is and whether we can rationalize these choices via well-behaved utility functions.[9]

Second, Kranton, Pease, Sanders, and Huettel (2016) employ minimal and natural (Democrats versus Republicans) groups to make sense of seemingly contradictory findings of inequity aversion and harmful conflicts among different groups. In addition, the authors study several different allocation games in a within-subject design. They also estimate mixture models with Charness and Rabin (2002) and Chen and Li (2009) type of utility functions and then *classify* people into four different types (inequality aversion, selfishness, total income maximizers and dominance-seekers) based on posterior probabilities of the mixture model. Moreover, as the authors elicit choices in games where destruction of other peoples income is possible at a personal cost, they can also identify "dominance-seeking" subjects. This identification is not possible with the downward-sloping budgets in my experiment. Interestingly, Kranton et al. (2016) also find the treatment effect is about the same when group membership is artificially induced with preferences over Klee and Kandinsky paintings relative to natural group membership.

Nevertheless, their design does not allow for the answer to two main sets of questions I am interested in. First, my design allows for the decomposition of equity-efficiency trade-off and the weight on *self* relative to *other* at the individual-level. Hence, my design does not require assumptions about the number and form of the most prevalent preference types in the population. Consequently the current experiment does not require any assumptions on how precisely people solve these two fundamental trade-offs or about their within-subject correlation. Second, given the large number of choices per individual with varying prices for giving, my experiment also allows for the question to be answered as to whether the rational choice approach is suited to study preferences with group identity - a common, but basically untested assumption in the literature of group identity.[10]

Lastly, Guala and Filippin (2015) study in a cleverly designed laboratory experiment, whether

[9] Also, it is not immediately clear how to interpret giving to one's own parents in a dictator game. For example, it could be that participants keep all the money for themselves in the experiment and then share the money with their parents afterwards.

[10] While working on this paper, I became aware of the work of Sudeep Bhatia. He pursued a similar idea as the current paper. A draft of this experiment is however not available online, instead he kindly sent me a personal copy. It is from this draft that I am familiar with his experimental design. Bhatia elicits 33 choices per subject, not employing a graphical design. We now know however that less than, say, 50 individual decisions does not deliver enough statistical information in order to reliably estimate utility functions and not enough power to reject random clicking behavior from rational choices, see the online appendix of Fisman, Kariv, and Markovits (2007). Hence, his dataset ultimately also does not allow to answer the questions I tackle in the current paper.

different framing of decision tasks can affect choices in dictator games with group identity. Hence, their work is related to the question whether identity preferences stem from maximizing behavior. Guala and Filippin (2015) find that framing affects choices and take this as evidence that the rational choice approach to group identity is misguided. As mentioned earlier, the findings of the current paper point in the opposite direction in a modified dictator game with linear, downward sloping budgets. As I will argue later, one explanation for this difference might be that subjects might be more used to solving problems with actual monetary trade-offs (negatively sloped budget sets).

3 The Experiment

3.1 Procedural Details

I ran seven sessions (four in-group, three out-group) with 12 to 20 participants each and 116 subjects in total. This took place in April and May at the MLab of the University of Mannheim. Payments were between 4 and 18 euros with an average of 8.3 euros.[11] A session lasted approximately 45 minutes. No participant participated more than once in the experiment. Participants were invited using ORSEES (Greiner, 2003) and the experiment was programmed in z-Tree (Fischbacher, 2007). One round was randomly drawn for every subject to be paid out. Every participant received money in their role as dictator as well as money as a passive recipient. In addition, subjects received potential earnings from the first identity inducement stage. The participant was either from the in- or the out-group, depending on the treatment. The payments however, were not organized in pairs, i.e., the participants would not necessarily receive money from the same person they give money to as a dictator (which was known). In addition, there was no feedback between each decision in the experiment. Subjects were only informed about their payments after the experiment. All payments were expressed in experimental tokens with ten tokens equaling one euro. Anonymity was cautiously respected during the whole experiment and it was emphasized that no participant would receive any information about choices or payments of others. There was a short exit survey at the end of the experiment asking subjects about their age, gender, political attitudes and whether they thought the experiment was easy to understand. The average age was 22.7 years and 60% of the participants were male. A translated version of the instructions can be found in the appendix.

[11] The hourly student wage is about 8.5 euros.

3.2 Identity Inducement

This part of the experiment was identical in both treatments. Subjects first indicated their preferences over five different pairs of Klee and Kandinsky paintings.[12] Subjects, based on their choices before, were then told whether they were part of the Klee or the Kandinsky group. The program thereby ensured both groups were equally large in every session. In principle, it was therefore possible to become, for example, a member of the the Klee group when actually preferring Kandinskys paintings in a majority of decisions. In case of a tie, participants were randomly assigned a group membership. If anything, this approach should have made group identification less strong.

This stage was followed by a quiz, in which subjects were asked to guess the painter of three more paintings (either Klee or Kandinsky). Before indicating their final guess, participants could see their own group member guesses - only then they would state their final guess. Subjects would earn one euro for each task if the majority of their group guessed correctly. Moreover, they would get an extra euro if their group had more correct answers than the other group. During the entire quiz stage subjects could communicate with members of their own group via a chat program. The communication during the experiment was exclusively on the subject of the paintings and the painters.

3.3 Modified Dictator Game

The main part of the experiment consisted of a series of modified dictator games with varying prices for giving. In using these modified dictator games, I am relying on similar graphical representations of linear budgets sets as in the pioneering work of Fisman, Kariv, and Markovits (2007) - for social preferences, and Choi, Fisman, Gale, and Kariv (2007) for risk preferences. Every decision task consists of clicking on the preferred distribution of money between *self* and *other* on a computer screen. In addition, for every click, there was a box indicating the precise numbers of tokens allocated to *self* and to *other*. Once the preferred allocation was indicated, it needed to be confirmed by clicking the OK button. Choices were not confined to the budget line, instead it was possible to click everywhere in the budget set. For every decision task the computer randomly drew both intercepts from a uniform distribution between 10 to 100 tokens (independently for every decision task and across subjects). Hence, the modified dictator game studied here varies the price for giving such that $B = p_s\pi_s + p_o\pi_o$, whereas B denotes the budget, π_s (π_o) the amount given to *self* (*other*) with corresponding price p_s (p_0). The traditional version of this game fixes $p_0 = p_s$. The (absolute value of the) slope of the budget, $\frac{p_o}{p_s}$, can be interpreted as the relative price for giving. The great advantage of this experimental tool is in how many different choices per individual can be

[12] In this part, I basically follow Landa and Duell (2015) augmented by a chat program. Screenshots of the experiment can be found in the appendix.

elicited. The reason for this is the intuitive, graphical representation of allocations. The variation in the price for giving combined with the large number of choices allows for the identification of the equity-efficiency trade-off as well as the weight people put on other people's income at the individual level. Moreover, repeated choices with different intersecting budget sets allows for the evaluation of the consistency of choice data with GARP.

Every subject made 50 choices in this part of the experiment.[13] The treatment varied whether the recipient was from the in-group or from the out-group. Small pictures of a Klee or Kandinsky painting at both axis visually indicated the group membership of the decision maker and the recipient.[14] The treatment effect is identified from between-subject variation, in other words, every subject participated only in the in-group or the out-group treatment.[15]

4 Rationality

Various allocative decisions with intersecting budgets allows for the bringing of demand analysis tools to the study of distributional preferences. GARP posits that if a consumption bundle $\pi = (\pi_s, \pi_o)$ is strictly revealed preferred to $\pi^{'} = (\pi_s^{'}, \pi_o^{'})$, then $\pi^{'}$ cannot be strictly revealed preferred to π. This statement is generally seen as a basic criterion of rationality in decision-making as it rules out preference cycles. Afriat's theorem (Afriat, 1967) then tells us that if the choice data satisfy GARP one can treat them as coming from some well-behaved (continuous, concave and strictly monotone) utility functions.

However, GARP is a binary criterion in the sense that choice data either satisfy GARP or not. Since people are prone to make errors, a continuous measure of rationality is more desirable. Afriat's (1972) Critical Cost Efficiency Index (CCEI) provides such a measure. It measures the degree to which each budget line has to be adjusted in order to remove all violations of GARP. This index lies naturally between zero and one, where a CCEI score equal to one indicates no violation of GARP. This score can be interpreted as the amount of money a decision maker wastes.[16]

[13] As Fisman et al. (2007) show in their web appendix, a smaller number of choices per individual does in general not yield the power to distinguish rationality from random clicking behavior.

[14] A screenshot can again be found in the appendix.

[15] In principle one could also identify the effect of group identity within-subject, which would for example allow to estimate individual utility functions where the two parameters are both estimated as a function of a treatment dummy. I did however opt against this design because it would require at least, say, 100 choices per individual, which appears to be a relatively high number.

[16] There are also other indices such as the 'money pump' index' by Echenique, Lee, and Shum (2011) or the 'minimum cost index' by Dean and Martin (2013). The CCEI is however most widely used in the empirical literature and computationally comparably simple which is why I remain with to this index. See also Smeulders, Cherchye, Spieksma, and De Rock (2013). For a more detail treatment of revealed preference analysis, please see Crawford and De Rock (2014) and Chambers and Echenique (2016).

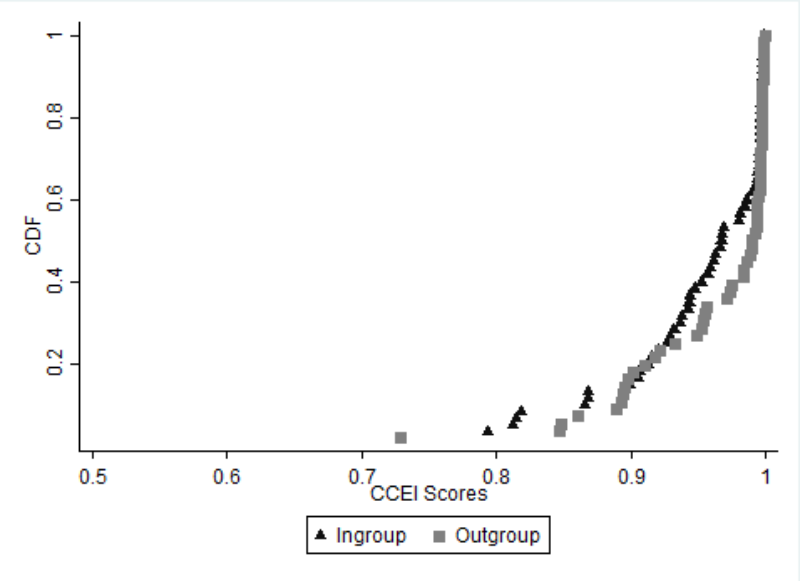

Figure 1: Empirical distribution function of CCEI scores for both treatments.

The two cumulative distribution functions (CDF) of the CCEI scores for each treatment are depicted in figure 1. The scores are mostly close to one with a majority of subjects having scores above 0.9 in both treatments with a total average of 0.96. There are also no apparent differences between both treatments, which is confirmed by a non-parametric χ^2 test on the equality of means ($p \approx 0.19$). I follow Fisman et al. (2007) and adopt a CCEI score of 0.8 as a threshold for rational behavior. Only three subjects have scores below 0.8, which leads me to conclude that choices in both treatments overwhelmingly stem from well-behaved utility functions. Additionally, six subjects do not always click on the budget frontier, that is, they violate budget balancedness. Consequently in what follows, I drop 8 out of 116 subjects in total (one subject has both a CCEI score below 0.8 and clearly does not click on the budget frontier).[17]

[17]Fisman et al. (2007) allow for a confidence interval of five tokens. I find that nine subjects make at least one choice that is more than five tokens away from the budget frontier. I keep three of those subjects (subject id's 43, 55 and 68) because this violation, with the maximum distance to the frontier slightly above five tokens, clearly seems to be an outlier relative to the other 49 choices they each make. I drop the other six subjects (id's 18, 22, 27, 59, 69 and 101) and also subjects 35 and 49 who both have a CCEI score below 0.8. This general picture does not however change much if I allow for a tighter confidence interval. For instance, almost 75% of subjects do not make a single choice outside a confidence interval of 2.5 tokens. Overall more than 91% of the choices are within a one token confidence interval.

5 Distributional Preferences with Group Identity

5.1 Individual-level Distributional Preferences and Econometric Framework

The analysis of the degree of rationality revealed that choices in the experiment can overwhelmingly be rationalized by well-behaved utility functions. I go on to describe the behavior of the remaining subjects $i = 1, ..., 108$ with constant elasticity of substitution (CES) utility functions of the form

$$U_i(\pi_s, \pi_o) = [\alpha_i \pi_s^{\rho_i} + (1 - \alpha_i)\pi_o^{\rho_i}]^{\frac{1}{\rho_i}}, \tag{1}$$

where π_s is the income to *self*, π_o is income for *other*. The parameter α_i thereby determines the weight i puts on *self* relative to *other*. If $\alpha = 0.5$ *self* is as important as *other*, $\alpha = 1$ implies full selfishness. The second parameter on the other hand, ρ_i, describes the curvature of the indifference curve in the (π_s-π_o) space. Hence ρ determines the equity-efficiency trade-off. In particular, if $\rho > 0$, preferences are geared towards maximizing pay-offs, and if $\rho < 0$ reducing inequality is more important. For $\rho \to -\infty$ preferences tend towards maxi-min preferences, for $\rho \to 0$ indifference curves take the Cobb-Douglas form and if $\rho = 1$ preferences become utilitarian (efficiency-minded).

The CES demand function is then given by

$$\pi_{s,i}^n(p_s^n, p_o^n, B) = \left[\frac{\frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}}}{\frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}} + \frac{p_o}{p_s}^{\frac{-\rho_i}{1-\rho_i}}} \right] \frac{B}{p_s^n}, \tag{2}$$

where B is the budget and n denotes the decision problem. With $u_i = \frac{\alpha_i}{1-\alpha_i}^{\frac{1}{1-\rho_i}}$ and $v_i = \frac{-\rho_i}{1-\rho_i}$ one gets the following econometric specification:

$$\frac{p_s \pi_s}{B} = \frac{u_i}{u_i + \frac{p_o^n}{p_s^n} v_i} + \varepsilon_i^n. \tag{3}$$

The error term ε_i^n is assumed to be normally distributed, u_i and v_i can be estimated as censored Tobit model via non-linear least squares or maximum likelihood.[18]

Table 1 summarizes the number of tokens held and passed in the experiment additionally to the estimates of α, ρ, the CCEI scores and the final profit by treatment. Subjects in the in-group treatment hold, on average, almost seven tokens less than in the out-group. This is substantiated in the estimated average α which is clearly lower in the in-group treatment (0.73 versus 0.8). The mean values for ρ on the other hand, differ much less in both treatments with ρ being higher in the out-group (0.48 versus 0.52).[19] The higher efficiency focus in the out-group is also reflected in the

[18] I report only non-linear LS results here. Results from maximum likelihood estimations are effectively the same.

[19] Note that $\alpha \in [0, 1]$ whereas the value of ρ is not restricted to be positive, hence the effect size of α is also clearly more important relative to the scale of both parameters.

	Ingroup	Outgroup
Tokens Hold	53.0	59.8
Tokens Pass	11.7	6.0
Hold-rate	0.81	0.90
Pass-rate	0.19	0.10
Alpha	0.73	0.80
Rho	0.48	0.52
CCEI	0.96	0.97
Final Profit	8.1	8.6
N	58	50

Table 1: Summary statistics of giving behavior by treatment.

higher final profits in this treatment: subjects in the out-group treatment earn on average 50 cents more.

Figure 2 depicts the empirical CDF of α separately for each treatment. It is noteworthy that the distribution of α differs significantly between both treatments: the values of α cover the whole interval between $\frac{1}{2}$ and 1. The CDF of the outgroup treatment is visibly to the right of that of the in-group until $\alpha \approx 0.9$, where the two functions are approaching each other. Hence, it seems that the number of relatively selfish individuals is hardly affected by the treatment.[20] A non-parametric χ^2 test (null hypothesis equality of means) shows a p-value of $p < 0.01$ and thus confirms the earlier conclusions. A non-parametric Kolmogorov-Smirnov test rejects equality of distributions ($p \approx 0.01$).

An intriguing pictures emerges in Figure 3 with the plotting of the CDF of ρ by treatment. The first thing to note is the relatively high average focus on efficiency relative to equality - as all parameters are positive across both experimental conditions. Second, nevertheless, there is once again a visible heterogeneity in behavior across subjects. Third, eye-balling suggests the variance decreases in the out-group treatment relative to the in-group: the out-group CDF is clearly below the in-group CDF until $\rho \approx 0.55$ and then lies above. This impression is also confirmed by the summary statistics as the standard deviation of ρ is 0.22 in the in-group and 0.15 in the out-group. A χ^2 test of equality of means exhibits a p-value of $p = 0.06$, suggesting the mean inequality aversion is statistically significantly higher in the in-group treatment at the 5% level. The difference in point

[20] In particular, the fraction of people with $\alpha > 0.9$ ($\alpha > 0.91$) is 23% (22%) in the in-group treatment and 32% (25%) in the out-group.

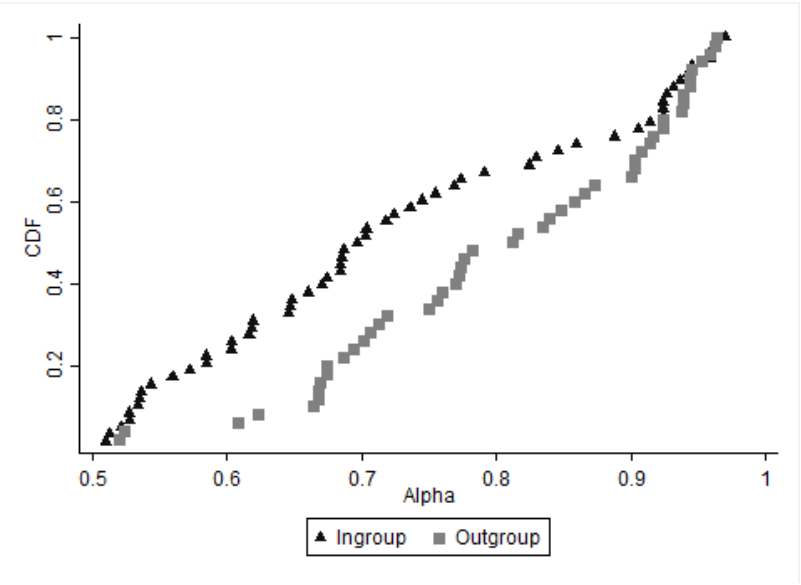

Figure 2: Empirical distribution function of α for both treatments.

estimates however, seems economically less relevant than the differences between the mean α, in particular because α is restricted to the unit interval whereas ρ is not. A Kolmogorov-Smirnov test for equality of distributions displays a p-value of $p = 0.058$, suggesting the treatment also changed the *data-generating process* of ρ and not only the mean.[21]

Table 2 provides an overview over the different statistical tests for treatment differences in both parameters. To sum up, the experimental treatment significantly changed distributional preferences. When giving to the out-group, subjects not only behaved significantly more selfishly, they also became more accepting of inequality, relative to the in-group treatment. Both effects potentially support a decrease in redistribution in heterogeneous societies. Moreover, the experiment reveals vast differences in behavior, with potentially important consequences, something the average treatment effect would miss. It is also noteworthy that the within-subject correlation between α and ρ is basically zero within and across treatments.

[21] Note also that a Wilcoxon-Mann-Whitney test fails to find statistically significant differences between both empirical distributions ($p = 0.17$), see Table 2. However, in the current setting a KS test seems more appropriate than the WMW test as the former uses the maximum difference in the empirical CDFs as a test statistic. The latter sums the ranks of all observations. This test statistic will not necessarily detect a treatment effect when the treatment does not affect the mean as the sum of ranks might still be equal for both distributions.

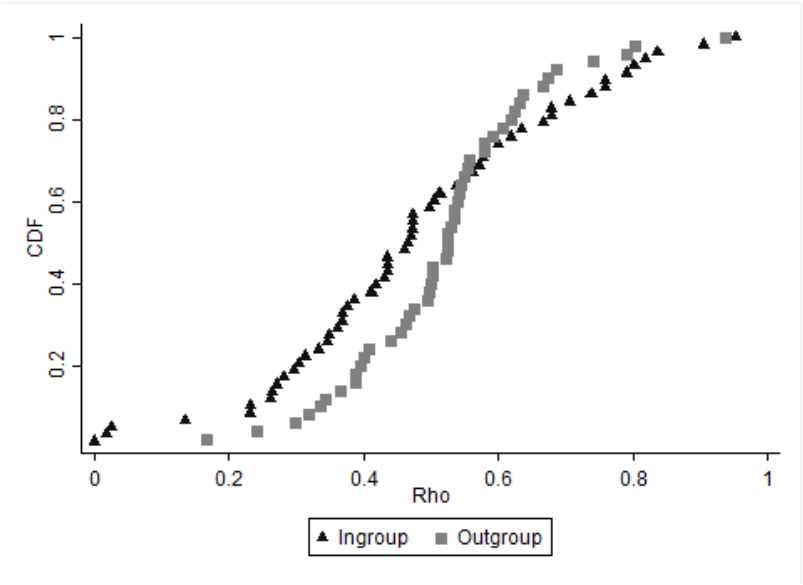

Figure 3: Empirical distribution function of ρ for both treatments.

	Alpha	Rho
Equality of Mean	< 0.01	0.05
Wilcoxon-Mann-Whitney	< 0.01	0.17
Kolmogorov-Smirnov	0.01	0.06

Table 2: Test for Treatment Effects. Table depicts p-values, H0: no treatment effect. $N = 108$.

6 Additional Results

6.1 Political Preferences

Several pieces of evidence suggest that these experiments possess some external validity in different contexts. Choi, Kariv, Müller, and Silverman (2014) find that CCEI scores in the experiment predict wealth in real life in a representative sample. Fisman, Jakiela, and Kariv (2015) show for the US that the individual equity-efficiency trade-off predicts voting behavior. Finally, Fisman, Jakiela, Kariv, and Markovits (2015) find that the same parameter predicts the career choices of their participants. In this section, I assess the external validity of the experimental measures elicited here, naturally in a different experimental context. I run regressions using political left-right self-assessment on a scale from 1 to 10, where 1 means extremely left and 10 means extremely

Political Preferences	(1)	(2)
α	3.00^{***}	1.84^{*}
	(1.09)	(1.08)
Controls	No	Yes
Constant	3.27^{***}	5.89^{***}
	(0.86)	(1.21)
N	108	103
R^2	0.10	0.19

Table 3: OLS regression, robust standard errors in brackets. Dependent variable is the political left-right self-assessment from 1 to 10. *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. Control variables include a treatment dummy, gender, age, religion, trust and a dummy indicating if subject studies business or economics.

right, as dependent variable. Using a sample of German students, I find that α, and not ρ, predict political preferences in the sense that more right-leaning voters are more selfish. The individual equity-efficiency trade-off does not predict political preferences. Table 3 depicts the results using α and table 4 using ρ as a predictor of political preferences. The inclusion of a set of control variables does not affect the conclusions in any case. Also, recoding the dependent variable from one to ten to one to three (left-center-right), and using ordered logit regressions instead of linear least-squares, delivers very similar results. The coefficient in column (2) of table 3 approximately implies, that if a subject would move from being completely social ($\alpha = \frac{1}{2}$), to complete selfishness ($\alpha = 1$), it would ceteris paribus, on average be a little less than one point more right-leaning on a one to ten scale.

Furthermore, one might also wonder whether the treatment effects depends on political preferences. That is, whether conservatives or left-leaning voters are more likely to adjust their behavior in reaction to the treatment. Anecdotal evidence also suggests more right-wing voters care more about their social group and, may as a result, also react more strongly to social heterogeneity. Table 5 shows this is not the case, at least in my experiment. The table presents results from OLS regressions with α (columns 1 and 2) and ρ (columns 3 and 4) as a dependent variable. The explanatory variable of interest is the interaction term between the treatment dummy (which is one in the out-group treatment) and political preferences (treated as continuous), which basically comes down to a difference-in-difference model. The interaction dummy indicates how much more strongly more

Political Preferences	(1)	(2)
ρ	0.72	0.16
	(0.75)	(0.80)
Controls	No	Yes
Constant	5.12^{***}	7.15^{***}
	(0.46)	(1.07)
N	108	103
R^2	0.04	0.16

Table 4: OLS regression, robust standard errors in brackets. Dependent variable is the political Left-Right self-assessment from one to ten. *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. Control variables include a treatment dummy, gender, age, religion, trust and a dummy indicating if subject studies business or economics.

right-leaning participants react to the treatment. As the table shows, this coefficient is, for both α and ρ, basically zero, and not statistically significant with very tight confidence intervals around it. These results are unchanged if I estimate Tobit models for α and quantile regressions with ρ as dependent variable. Moreover, recoding political self-assessment to take on three different values (left-center-right), again does not affect the results significantly. Hence, it seems that individuals do not seem to differ in their reaction to the treatment depending on their political orientation.It is also noteworthy how politically extreme individuals, regardless of left or right, do not differ in their reaction relative to more moderate individuals. Figures 7 and 8 in the appendix depict the CDFs of both α and ρ by left- versus right-leaning political attitudes and treatment.

Dep. Variable	α		ρ	
Politics x Treatment	-0.02	-0.00	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Controls	No	Yes	No	Yes
Constant	0.56^{***}	0.63^{***}	0.44^{***}	0.58^{***}
	(0.06)	(0.10)	(0.08)	(0.15)
N	108	103	108	103
R^2	0.14	0.22	0.02	0.12

Table 5: OLS regression, robust standard errors in brackets. Dependent variable is either α (columns 1 and 2) or ρ (columns 3 and 4). Political preferences are between one (left) and ten (right). *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. Control variables include a treatment dummy, political preferences, gender, age, religion, trust and a dummy indicating if subject studies business or economics.

6.2 Analysis of Gender Differences

I also analyze potential gender effects. Table 6 presents the results from OLS regressions with α and ρ as dependent variable and a gender dummy and its interaction with the treatment dummy as right-hand side variable of interest. Consequently, the coefficient on the interaction indicates how much more females react to the treatment relative to males. The results show that females are both less selfish (α is lower on average) and more inequality averse (ρ is lower) compared to males. Moreover, it also appears that women adjust ρ (but not α) more strongly in reaction to the treatment in the direction of less inequality aversion. This can be seen in the interaction term in the last two columns of table 6 as it is statistically significant at conventional levels. Again, censored Tobit models and quantile regressions deliver very similar results. The empirical CDFs by gender for both parameters are depicted in the appendix (figures 9 and 10).

Dep. Variable	α				ρ			
Female	-0.07^{**}	-0.04	-0.09^{**}	-0.08^{**}	-0.11^{***}	-0.10^{**}	-0.19^{***}	-0.19^{***}
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)
Interaction Term	-	-	0.04	0.06	-	-	0.17^{**}	0.17^{**}
			(0.05)	(0.05)			(0.07)	(0.07)
Treatment Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
N	106	103	106	103	106	103	106	103
R^2	0.13	0.20	0.14	0.21	0.10	0.12	0.15	0.16

Table 6: OLS regression, robust standard errors in brackets. *, ** and *** indicate significance at the 10%, 5% and 1% level respectively. A constant is included in all cases but not displayed here. Control variables include a treatment dummy, gender, age, religion, trust and an indicator if subject studies business or economics. The interaction term equals one for females in the out-group treatment.

7 Concluding Remarks

The current paper estimates the causal impact of group identity on distributional preferences at the individual-level using a controlled laboratory experiment. This effect is important because in socially heterogeneous societies it will also determine preferences for redistribution and voting behavior on a large range of economic issues. Subjects in the experiment displayed a self-interested bias, but only a minority was completely selfish. The data also revealed that people put, on average, more weight on income of in-group members. However, it appears the number of selfish individuals is not influenced by the treatment. The data also supports the hypothesis that participants become less inequality averse (more efficiency-minded) in the out-group treatment. Nonetheless, this effect is clearly smaller in magnitude and less economically significant than the former effect.

The results also revealed sizable heterogeneity of distributional preferences with behavior spanning the whole spectrum from social to selfish and with different shades of equity-efficiency trade-offs between Cobb-Douglas and utilitarian-type indifference curves. In particular, the treatment effect on the equity-efficiency trade-off is subtle, as the *average* treatment effect is relatively small. Instead, it seems the treatment actually decreased the variance of the data-generating process. Hence, pooling data is likely to miss important aspects of behavior. I also uncover heterogeneous treatment effects as females (and social individuals) seem to react more strongly to the treatment. The effect does however, maybe surprisingly, not depend on political orientation.

As a second contribution, I also show that most subjects exhibit only very small GARP violations (very high CCEI scores) *across both treatments*. That is, subjects behave as if they maximize a social utility function. Thus, this experiment contributes to the debate on how preferences with group identity can best be understood theoretically. While there is a plethora of empirical evidence showing groups mean something to people, there is little evidence as to whether the rational choice approach to group identity is fruitful or, if this behavior should be viewed as a form of bias or irrationality. The former approach would require the inclusion of an extra parameter in a social utility function, as for example in Chen and Li (2009). The latter approach assumes that it would be wrong to think of these choices as being the outcome of a maximization process at all. My data clearly support the rational choice approach to distributional preferences with group identity. Previous experiments in this area were not designed to test the experimental choice data for consistency with utility maximizing behavior as such a test requires a large number of choices from every participants with varying relative prices for giving. Therefore, the current dataset is unique in the sense that it is, to the best of my knowledge, the only one which allows to address this question. The finding that the choice data is the outcome of a maximization process also suggests there is little room for 'soft' policy interventions, such as nudges, if one would wish to influence behavior.

These findings contrast with those of Guala and Filippin (2015) who argue that, possibly irrational, framing effects drive behavior in allocative choices with group identity. Intriguingly, the different conclusions of the current experiment and of Guala and Filippin (2015) are mimicked in standard dictator games where there is evidence for both kind of approaches. Bardsley (2008) and List (2007) for example, find evidence to show behavior depends on the choice set. Andreoni and Miller (2002) as well as Fisman, Kariv, and Markovits (2007) on the other hand, find strong evidence for highly rational behavior in dictator games. How to explain these systematic differences in the traditional dictator game literature, as well as in the group identity literature, is an important, but, for the most part, still open question. One potential explanation might be that Andreoni and Miller (2002) as well as Fisman et al. (2007) and the current paper all use linear budgets with negative slopes.[22] That is, what these studies have in common is that subjects face an actual trade-off for giving to other people. This element is not necessarily present in other studies. An explanation could be that people are used to these kind of trade-offs in their daily lives and are therefore better at solving them.

Furthermore, I presented empirical evidence that corroborated the external validity of fairness experiments in general and in particular, this specific graphical approach to elicit allocative choices. I find that the degree of selfishness predicts political preferences in the sense that conservatives are more selfish, even after controlling for a battery of covariates. Since Fisman, Jakiela, and Kariv (2015) and Fisman, Jakiela, Kariv, and Markovits (2015) find that the equity-efficiency trade-off and not the weight on *self* predicts the political decisions of Americans, this findings raises new and intriguing questions about the underlying political differences in the United States and Europe.

The data also reveals differences in behavior in both genders. I find that females are mainly more inequality averse but also, to a lesser extent, less selfish. Additionally, females seem to be more prone to react and adjust their degree of inequality aversion.

On a more general level, the current experiment implies, as Alesina, Glaeser, and Sacerdote (2001) argue, that social heterogeneity can be one of the reasons for the observed differences in the size of welfare states across countries and continents. Interestingly, the current experiment suggests two potential channels. First, people value income of the out-group less than that of the in-group. Hence, if voters expect that the out-group will profit from a redistributive policy, then, ceteris paribus they will be more opposed to this policy. Second, participants also become more tolerant of inequality, which will also decrease the desire to redistribute income or wealth. Taken together, the findings in this paper suggest that social heterogeneity causally impacts the demand for redistribution and hence plays an important role in shaping economic policies.

[22] Andreoni and Miller (2002) also study positively sloped budgets but do not calculate CCEI scores for these choices.

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A Appendix

A.1 Screenshots

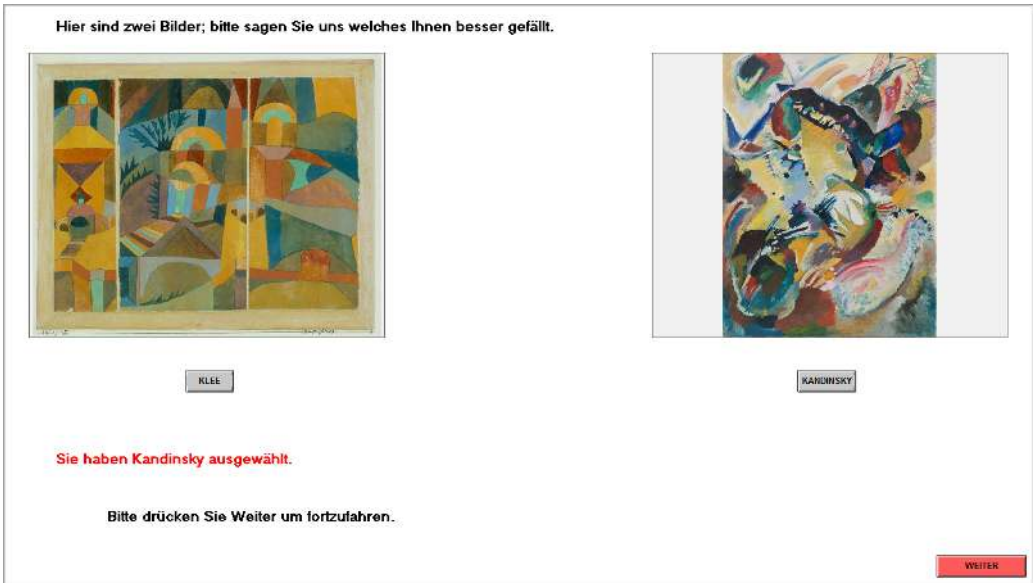

Figure 4: Screenshot identity inducement.

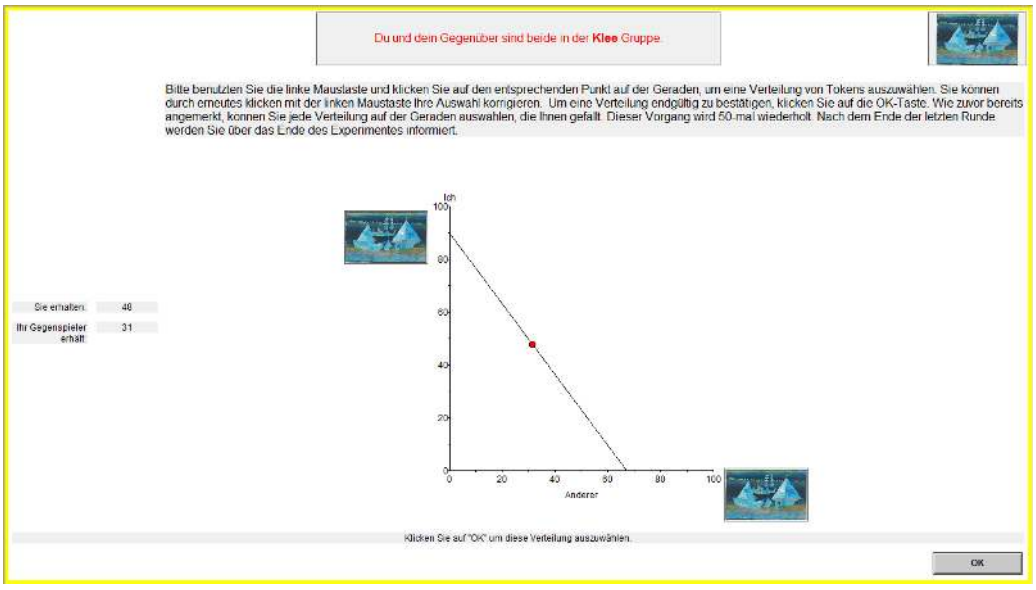

Figure 5: Screenshot Modified Dictator Game - In-group.

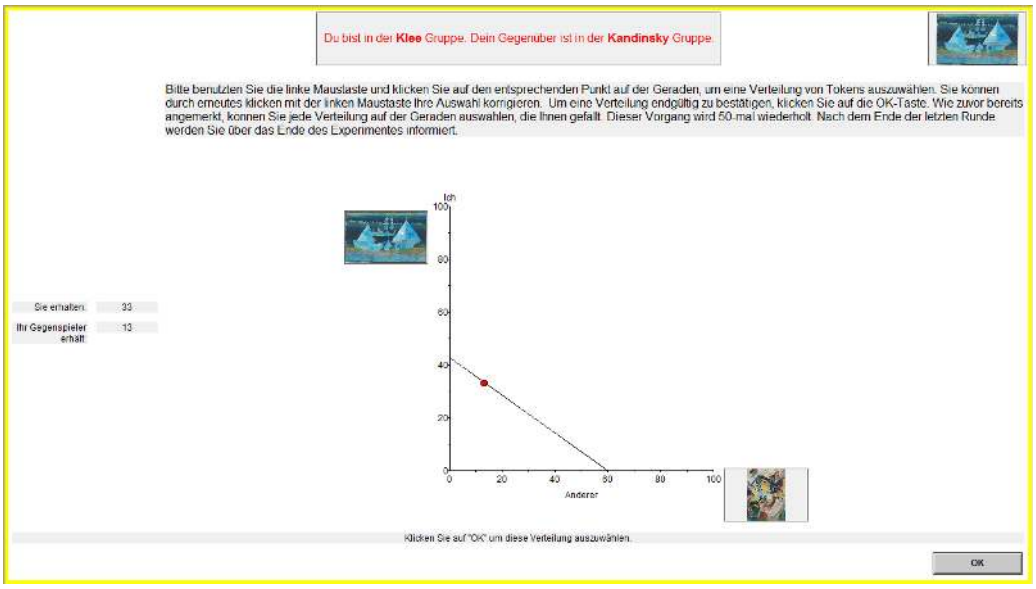

Figure 6: Screenshot Modified Dictator Game - Out-group.

A.2 Additional Figures

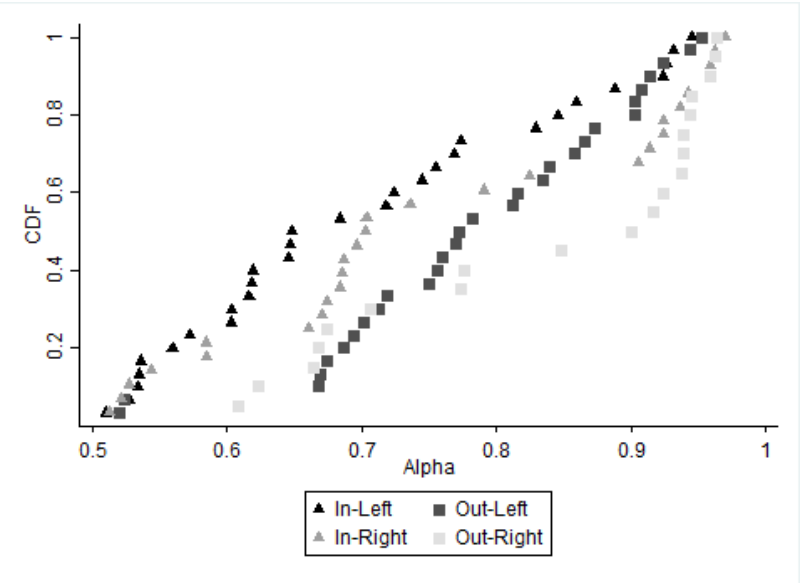

Figure 7: CDF of α by left- versus right-leaning voters and treatment.

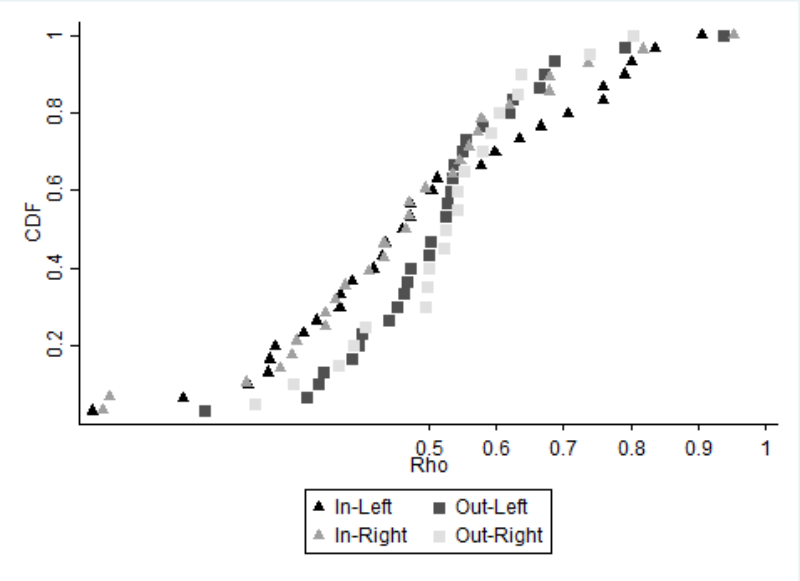

Figure 8: CDF of ρ by left- versus right-leaning voters and treatment.

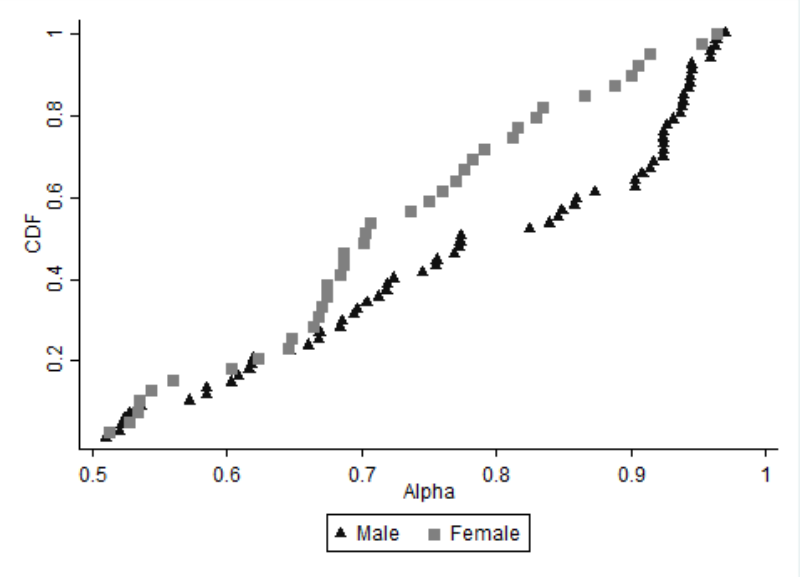

Figure 9: CDF of α by gender.

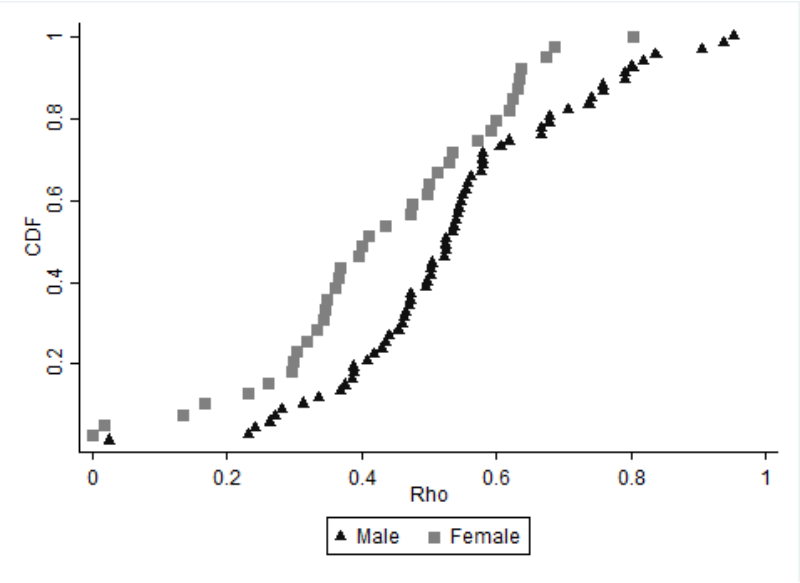

Figure 10: CDF of ρ by gender.

A.3 Translated Instructions

Introduction

In this experiment you will make a series of decisions. Your payment at the end of the experiment will depend on your own decisions as well as on the decisions of the other participants. Please follow the instructions carefully since every decision you make may influence your payment.

This experiment consists of two parts. Your overall payment will be determined by your payments in each part of the experiment as well as a participation reimbursement of two euros. We will start with a short introductory phase and the first part of the experiment. Afterwards you will get further instructions for the second part of the experiment. After the instructions have been read aloud I will answer any question you may have. In case there are any further questions during the experiment feel free to raise your hand.

Part 1: Assignment to Painter-groups

In part 1 of the experiment five pairs of paintings of the two artists Paul Klee and Wassily Kandinsky will be presented. You will be asked which of the paintings you prefer and based on your preferences you will be categorized as KLEE or KANDINSKY. You will be informed about your category. Your identity as KLEE or KANDINSKY and the identities of all others will remain the same for the rest of the experiment.

As a next step you will be asked to name the painter (Klee or Kandinsky) of three other paintings. After you made your first guess there will be the opportunity to exchange ideas about the painter's identity with other KLEEs in case you are one yourself or with other KANDINSKIES in case you are one yourself. You will communicate using a chat program and one can only see the messages of ones group members. It will not be possible to read the messages of the other group. Please do not reveal your identity or other personal information. Before you submit your final answer you are allowed to change your first guess.

Lets assume you are a KLEE and at least half of all KLEEs have given the correct answer. Than you and all other KLEEs receive 1 euro independent of whether your final answer was correct or not. If you are a KLEE and at least half of all KLEEs have given the wrong answer than you and all other KLEEs receive 0 euros even if your own answer was correct.

Furthermore, if you are a KLEE and you and all the other KLEES have given in total more correct answers considering all three questions than all KANDINSKYs, you and all other KLEEs receive another euro.

If you are a KANDINSKY and you and all the other KANDINSKIES have given in total more correct answers considering all three questions than all the KLEEs, you and all the other KANDINSKYs will receive another euro.

We will now begin with the first part of the experiment. After the first part is finished you will

receive instructions for the second part of the experiment

Part II: Dictator Game

In this second part of the experiment you will face 50 decision problems. All decision problems are constructed similarly: Each time you will be asked how many tokens you want to keep for yourself and how many tokens you want give to another participant of the group. The only thing you know about the other participant is that he is [not] part of your [Klee/Kandinsky] group [but is part of the [Klee/Kandinsky] group]. In each decision you will have to choose a point on a line in a chart. The line represents all possible distributions and each point on the line represents a different distribution of tokens between you and the other participant from the [Klee/Kandinsky] group. Remember that 10 tokens equal 1 euro. An example of such a decision problem is depicted in the chart 1.

[Example chart 1]

Each new decision problem starts with the computer choosing a new line that intersects the horizontal axis representing your income or the vertical line representing the other participants' income between 10 and 100 tokens. All the lines will be chosen randomly. They are independent of each other and are also independent from the decision problems of other participants. For example in chart 2 point A represents a distribution in which you will receive y tokens and the other participants will receive x tokens. A different distribution would be for example B in which you will receive yy tokens and the other participant will receive xx tokens.

[example chart 2]

Please use the left mouse button and click on a point on the line to choose a distribution of tokens. You can change your choice by clicking on a different point on the line using the left mouse button. By pressing the OK button you submit your final answer. As mentioned earlier you may choose any distribution you like. This process is repeated 50 times. After the last round you will be informed about the end of the experiment.

Payments in Part 2

Your payments (additionally to the 2 euros reimbursement for the participation and possible profit from the first part of the experiment) will be determined the following way. At the end of the experiment the computer will choose randomly one decision problem and it will be conducted which means you will receive the number of tokens you choose in that situation during the second part of the experiment. Additionally another participant from [your/the other] group will be assigned to you. This participant will receive the number of tokens you chose to give to other participant in the chosen decision problem from the second part of the experiment.

Therefore in this part of the experiment each participant will receive money from two different sources. On the one hand you will receive money based on your own decision in the randomly chosen decision problem and on the other hand you will receive money as a passive participant

based on the decision of another anonymous participant of [your/the other] group. Additionally, as mentioned before, you will receive money from the first part of the experiment in case you assigned the paintings to the painters correctly. At the end of the experiment the different payments will appear on the screen and the tokens will be transformed into euros. As mentioned before 10 tokens are worth 1 euro. You will receive your payments as soon as you have finished the experiment. In case there are no more questions you can start with the experiment.

This is the end of the experiment. We thank you for your participation. You will receive:
Xx tokens from your decision
Xx tokens from somebody else's decision
Plus 2 Euro for your participation
In total you will receive in tokens XX tokens or YY euros

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Daniel Müller

The anatomy of distributional preferences with group identity

Abstract
This paper dissects distributional preferences with group identity in a modified dictator game. I estimate individual-level utility functions with two parameters that govern the trade- offs between equity and efficiency and giving to self and to other. Subjects put on average less weight on income of the out-group, but overall only a minority behaves completely selfishly. Giving to the out-group also renders subjects more accepting of inequality. However, the experiment also uncovers a large heterogeneity of preferences. It seems that those who are social become slightly less social in the presence of the out-group. The number of selfish individuals is instead hardly affected. Moreover, choices in both treatments overwhelmingly stem from well-behaved, yet systematically different underlying social preference functionals. Hence this experiment suggests that the rational choice approach, which is predominantly used in the literature, is a useful tool to understand the effect of group identity on social preferences. Interestingly, I also find that the weight on self, but not the individual equity-efficiency trade-off, predicts political left-right self-assessment as more conservative voters are more selfish. I also document gender differences: females put less weight on self, are more inequality averse and react more strongly to the treatment.

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