Groupy and Non-Groupy Behavior:

Deconstructing Bias in Social Preferences

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Abstract: This paper deconstructs social preferences in group contexts and resolves the contradiction between laboratory findings of inequity aversion and the destructive reality of group conflict. The paper replicates previous results that subjects are—on average—inequity averse towards out-group participants and more so towards in-group. However, the mean is not representative. Using a with-in subject design and new econometric techniques, we find that more than half (54%) of subjects systematically diverge. Twenty percent destroy total income when facing an out group participant—sacrificing own income to lower out-group incomes. At the other extreme, thirty-four percent of subjects exhibit no bias at all; social preferences are the same for out-group and in-group. Thus some people are "groupy," responding readily to group divisions, and a third of subjects are "non-groupy," with unchanged allocations even when group divisions are salient. Response times and individual demographics support these findings.

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I. Introduction

This paper presents a novel experiment on group divisions and social preferences. In the classic economic paradigm, people pursue their own self-interest. But people are arguably also concerned with equity, fairness, and social welfare.[1] In economic experiments, subjects on average give up own income in order to achieve higher total income or more equitable allocations.[2] Recent experiments find that this average pro-social behavior is muted, but does not disappear, when participants are dealing with subjects outside their groups.[3] This picture of human beings, however, is apparently incomplete. Throughout time people have been unfair and cruel to others. History is marked with forced extraction of goods and labor, prolonged and destructive wars, genocide, and destructive conflicts between groups explicitly defined as different, in terms of characteristics, values, and principles.[4]

This study engages these contradictions in a novel experiment using new empirical techniques. In a simple income allocation task, we replicate previous results that—on average—subjects are inequity-averse towards out-group members and more so towards in-group members. However, we find this average is not representative. More than half of subjects (54%) have systematically different behavior. Twenty percent of subjects adopt particularly pernicious behavior toward the out-group—sacrificing own income to destroy out-group members' incomes.[5] On the other hand, thirty-four percent

1. For summaries of the arguments and perspectives from economics as well as other disciplines see Gintis, Bowles, Boyd, & Fehr (2006).

2. For the economics of social preferences and experiments, see, for example, Fehr & Schmidt (1999), Bolton & Ockenfels (2000), Andreoni & Miller (2002) Charness & Rabin (2002), Engelman & Strobel (2004).

3. Chen & Li (2009) find that subjects are inequity averse in that utility is lower when differences between incomes is higher, both when (i) the decision-maker has higher income than the recipient, and (ii) the decision-maker has lower income than the recipient. They estimate utility parameters for each case. Vis à vis out-group members, the utility losses from income differences are lower for (i) and higher for (ii) than the corresponding utility losses from income differences vis à vis in-group members.

4. A body of work in economics shows the negative impact of ethnic divisions on growth (see Alesina, Baqir, & Easterly (1999), Alesina & La Ferrara (2005), Easterly & Levine (1997), Esteban, Mayoral, & Ray (2012) for prominent studies).

5. This behavior is not punishment for non-cooperative behavior, "negative reciprocity," or other reactions to previous play found by, for example, Fehr & Schmidt (1999), Fehr & Gächter (2000), Charness & Rabin

of subjects treat in-group and out-group subjects identically. Uncovering this heterogeneity is critical to understanding and predicting responses to policies designed either to foment or quell group divisions.[6] Indeed, the range of behavior of the subjects in this experiment mirrors historical accounts of group conflict: some people actively harm out-groups, some people shelter out-group at their own peril, and some people simply seek to profit in all events.

We see these outcomes thanks to our with-in subject design and new econometric techniques. Subjects allocate income in a control and two group treatments. In *minimal groups,* subjects are divided according to answers to a questionnaire on preferences for lines of poetry, paintings, and landscape images. In *political groups*, subjects are divided into two groups according to a political questionnaire. Subjects who say they are Democrats (Republicans) are assigned to the Democrat (Republican) group. Subjects who say they have no party affiliation are assigned to Democrat (Republican) group if they say are they are "closer" to the Democrats (Republicans). Thus, within each political group, there are subjects who identify more and subjects who identify less with their assigned group. In each treatment, subjects allocate income to themselves and to subjects to whom they are paired, one in the subject's own group and one in the other group.

Our results grow out of our initial investigation of the relation between individual identity, groups, and social preferences. Following the robust findings in social psychology on minimal group effects, we expected subjects to favor in group participants in the minimal group treatment.[7] We expected subjects who identify more with their assigned political group to show relatively more favoritism in the political treatment. To test these hypotheses, we studied the full sample and we compared the self-identified

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(2002), Andreoni, Harbaugh & Vesterlund (2003), Falk, Fehr & Fischbacher (2008). A few experiments without group manipulations have found this kind of behavior (though with much less frequency). The behavior has been given different names, e.g., "spitefulness," "competitiveness," "nastiness," and "equity aversion" (Levine (1998), Fehr, Hoff, and Kshetramde (2008)), Abbink & Sadrieh (2009), Ibierri & Rey-Biel (2012), Fershtman, Gneezy, & List (2012)).

6. Fehr & Schmidt (2000) discusses the importance to theory of heterogeneity of social preferences per se. This paper shows the heterogeneity of response to group divisions.

7. For a comprehensive review of the group experiments, including minimal group experiments, in social psychology, see Haslam 2001. See Tajfel & Turner (1979) for the first studies.

Democrats to the no-political-party subjects "closer to" the Democrats, whom we call "D-Independents." We use these subsets because they are large enough to give power to our statistical tests and they are identical in political opinions and related demographics.[8] We test the following specific hypotheses: (1) both subsets favor the in-group in the minimal group condition, (2) Democrats and D-Independents exhibit a greater out-group bias in the political group relative to the minimal group treatment, (3) Democrats exhibit a marginally greater out-group bias in the political treatment than the D-Independents.

We find, however, that hypotheses (1) and (3) are wrong. First, in the minimal group treatment, Democrats exhibit a bias towards out-group members. D-Independents, however, allocate income almost identically to in-group and out-group members, and statistical tests fail to reject identical social preferences toward in-group and out-group. Thus, the paper finds a well-specified set of subjects that do not respond to a minimal group treatment.

As for hypothesis (3), both Democrats and D-Independents adopt more biased behavior in the political group treatment than in the minimal group treatment, but Democrats did not have a stronger marginal response. That is, while Democrats show an overall higher bias in the political condition, arguably much of this bias is due to a general bias towards an out-group per se, as exhibited in the minimal group treatment.

The marked difference between Democrats and D-Independents in the minimal group context leads to our investigation of possible systematic individual differences in response to group treatments. Exploiting our within subject design and using a latent-class model, we estimate *social-preference types* and classify each subject's play in different conditions and pairings according to these types. We then identify those subjects whose type does not change when allocating income to in-group vs. out-group participants. We find that only 26% of subjects change their type in the minimal group treatment vis à vis in-group and out-group, while 62% of subjects do not change their preferences and show no bias. (The remaining 13% do not pass either criterion). The percentage of subjects with no bias drops to 40% when the political treatment is included.

8. As shown in the on-line Appendix, Republicans and Republican-leaning subjects have similar behavior to their Democratic and Democratic-leaning counterparts. However, in our subject pool there are too few Republicans and Republican-leaning subjects to give power to the statistical tests.

Looking across the entire experiment (control, minimal group, and political group), more than a third (34%) of subjects never change their preferences.

The paper therefore reveals robust heterogeneity in behavior in group contexts; some people appear to be more "groupy," for lack of a better term. These "groupy" people—like many of the Democrats in our sample—respond readily to group divisions; the social salience of the group is not critical, and some adopt particularly destructive behavior towards the out-group. "Non-groupy" people—like many of the D-Independents in our sample—respond little if at all to group manipulations. Data on individual response times, reported at the end of the structural analysis, supports this argument. For the whole subject pool, looking at plausible behavioral and demographic correlates, we confirm that non-groupy subjects are significantly more likely to be politically independent. They are also more likely have fathers with high levels of education.

The paper is organized as follows. Section II places the paper in the literature, and Section III describes the experiment in detail. Section IV studies the raw data and the distribution of in-group favoritism in income allocations. Section V provides the structural estimation of average and individual social preferences and compares distributions of social preferences across conditions and pairings. Section VI identifies and studies patterns of "non-groupy" and "groupy" subjects. Section VII concludes.

II. Advancing the Literature

This experiment and analysis advance three interrelated strands of research. First, relative to the experimental study of social preferences, we uncover individual "(non)groupiness" as well as prevalent income-destroying behavior in group contexts. Using tasks pioneered by Charness & Rabin (2002) and also used by Chen & Li (2009), we replicate Chen & Li's (2009) seminal minimal group results that—on average—subjects are (less) inequity averse vis à vis (out) in-group members. To look behind this average, we consider individual social preferences—following the lead of, in particular, Andreoni & Miller (2002) and Fisman, Kariv and Markovits (2007)) but with different methods[9]—and find that about twenty percent of subjects seek to destroy out-group

9. Andreoni & Miller (2002) study a modified dictator game and find that 43% of subjects can be perfectly described by one of three canonical CES utility functions. They classify the remaining individuals by how

members income, while about a third of subjects never distinguish between in-group and out-group members.

Second, we find social identity is—and is not—a possible source of the varied response to group treatments, and thus this paper advances our understanding of identity and economic choices (Akerlof & Kranton 2000, 2010). Identity here, as in social psychology, describes an individual in terms of a social category or group, such as gender, race, ethnicity, nationality, political party, etc. One experimental approach to studying the impact of identity employs such "natural groups," with findings, for example, that the race or ethnicity of subjects relates to play in dictator and ultimatum games (Fershtman & Gneezy (2000), Glaeser, Laibson, Scheinkman, & Souter (2000)).[10] Related to the present study, Fowler and Khan (2007) find that—on average—Democrats (Republicans) give higher splits to Democrats (Republicans) in dictator games.[11] A second method creates social categories inside the laboratory, as in Chen & Li's (2009) minimal group paradigm.[12] The present study uses both methods and compares more or less salient group contexts[13] finding that for a subset of subjects, a group division per se is sufficient to generate bias and significant destructive behavior. For a second subset, a group

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closely choices match the behavior predicted by each of these CES functions, via a minimum distance criterion. Fisman, Kariv, and Markovits (2007) show, again using modified dictator games, that individual preferences have a wide range from prefect substitutes between own and other's payoffs, to Leontieff.

10. Further work shows that natural groups impact play in prisoner's dilemma, public goods and trust games (e.g., Goette, Huffman & Meier (2006), Bernard, Fehr, & Fischbacher (2006)). In an experiment studying redistribution, Klor & Shayo (2010) divide subjects according to their university fields of study and find subjects vote more often for the tax rate that favors in-group members.

11. In Fowler & Kahn (2007) each subject makes only three decisions (a dictator game vis à vis (1) an anonymous participant, (2) a Democratic participant, and (3) a Republican participant. Thus, no valid conclusions can be drawn about differences in individual choices across these decisions.

12. Chen & Li (2009) provide an extensive review of the minimal group paradigm and group effects in social psychology and economics. Other economic experiments using arbitrary groups, with different tasks, include Charness, Rigotti & Rustichini (2006), Chen & Chen (2011) and Hargreaves Heap & Zizzo (2009).

13. Goette, Huffman & Meier (2012) compare two sets of subjects, one randomly assigned to minimal groups and the other randomly assigned to groups that involve real social interactions leading to social ties. In the present experiment, any heightened group attachment would come from individual characteristics and identities and an assigned group that is more meaningful to a subject. Furthermore, we employ a within subject design and follow individuals in different contexts, studying individual heterogeneity in response to different treatments and the sources of this variation.

division must be related to socially meaningful identities. But for a large set of experimental subjects, a group division of either sort hardly matters at all.

Third, we employ new empirical methods to estimate and study individual behaviors. In a structural estimation of social preferences, we use a finite mixture model[14] that yields *social-preference types*, where the utility parameters for each type are not assumed but estimated, maximizing a likelihood function.[15] We then take a second step and classify individuals into types by using individual choices to construct a posterior probability that each individual is a certain type.[16] To our knowledge, the present study is among the first in experimental economics that takes these next steps, categorizing subjects into types[17] and using subject-specific data to study individual variation.

III. Description of Experiment and Subject Pool

The experiment was conducted at Duke's Human Neuroeconomics Laboratory, which follows the experimental economics protocol of no deception. The experiment involved 141 subjects drawn from the Duke University community.[18]

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14. Mixture models are relatively new to experimental economics. To the best of our knowledge Stahl & Wilson (1995) and Stahl (1996) were the first, and they and followers such as Bosch-Domènech et. al. (2010) estimate the proportion of subjects who reason at different levels. Harrison & Rutström (2009) and Conte, Hay, and Moffatt (2011) allow a mixture of expected utility and prospect theory.

15. Iriberri and Rey-Biel (2013) study heterogeneous behavior in dictator games by estimating a type distribution using the same utility function that we adapt. Flor & Shayo (2010) estimate individual specific utility parameters and classify subjects according to these parameters using a series of hypothesis tests. Many of these tests have low power leading to failures to reject, implying that the order in which the tests are done affects an individual's classification. Dawes, Loewen & Fowler (2011) categorize individuals by looking at five choices in dictator games and match the choices to a composite measure of subjects' outside-the-laboratory political participation.

16. In criminology Nagin (2005) develops this method of classification and uses arrest data to understand which individuals become career criminals and which only commit crimes as adolescents.

17. Fischbacher, Hertwig, and Bruhin (2013) use a mixing model and classify subjects into types by posterior distributions as in the present paper. Their goal is to study the relationship between response time and play in dictator games as a window on individual heterogeneity of social preferences.

18. Seventy-six percent were Duke students, 11% students from other schools (largely University of North Carolina, Chapel Hill), and the remainder were non-students (largely staff). Of the students, 86% percent were undergraduates. Eighteen percent of all subjects were born abroad. Sixteen percent were born in North Carolina, 12% in New York or New Jersey, and 6% in California, with the rest of the subjects born in one of 28 states or the District of Columbia. Students reported a wide range of major fields of study, many listing multiple fields. In all, 27 different fields were mentioned, with the most mentioned as follows: biology 21%, psychology/neuroscience 16%, economics 8%. The pool was 65% female.

Instructions	3-5 Minutes
Non-Group Control	
52 Choices	12 Minutes
Minimal Group or Political Group Treatment (randomized)	
Survey	2-5 Minutes
78 Choices	17 Minutes
Minimal Group or Political Group Treatment (randomized)	
Survey	2-5 Minutes
78 Choices	17 Minutes
Post Experiment Survey	3-5 Minutes

Figure 1. Timeline of Experiment

Sessions proceeded as in Figure 1. Subjects received instructions on the decisions they would make and practiced using the computer keys that would indicate their choices. (See the Appendix for instructions.) All sessions began with the *non-group* control. Each subject then made decisions in the *minimal group treatment* and the *political group treatment*, with the order randomized across subjects.[19] The post-experiment survey asked for demographic information (e.g., age, sex, major field of study, hometown).

In the control, subjects allocated money to themselves and randomly selected participants in two kinds of pairings: (1) themselves and other subjects, labeled YOU-OTHER, and (2) between two other subjects, labeled OTHER-OTHER.[20] The screens indicated the pairing, as in Figure 2 below for YOU-OTHER. The pairings occurred randomly. For shorthand below, the initials NG (non-group) designate the control.

In each group treatment, subjects were divided into two groups according to answers to survey questions. In the *minimal group treatment*, subjects were presented pairs of lines of poetry, landscape images, and abstract paintings (by Klee or Kandinsky) and asked which item in each pair they preferred. The items were matched (e.g., the

19. Chi-squared tests show no statistically significant difference between the distribution of social preferences for subjects receiving the minimal group treatment first vs. the political group treatment first.

20. The latter allocations do not affect a subject's own payoffs. The present paper does not use data from the Other-Other pairings or the Own-Other pairings in the group treatments.

landscape images were almost identical) so that this choice is unrelated to individual subject characteristics. The online Appendix provides examples. Subjects were then divided based on their answers to these questions and were given (true) information about similarity, or not, in answers to survey questions.[21] Subjects then allocated money in three kinds of pairings, presented randomly: (1) between themselves and one own-group member, labeled YOU-OWN, (2) between themselves and one other-group member, labeled YOU-OTHER, and (3) between one own-group member and one other-group member, labeled OWN-OTHER. For shorthand below, we refer to pairings (1) and (2) as MG You-Own and MG You-Other, respectively.

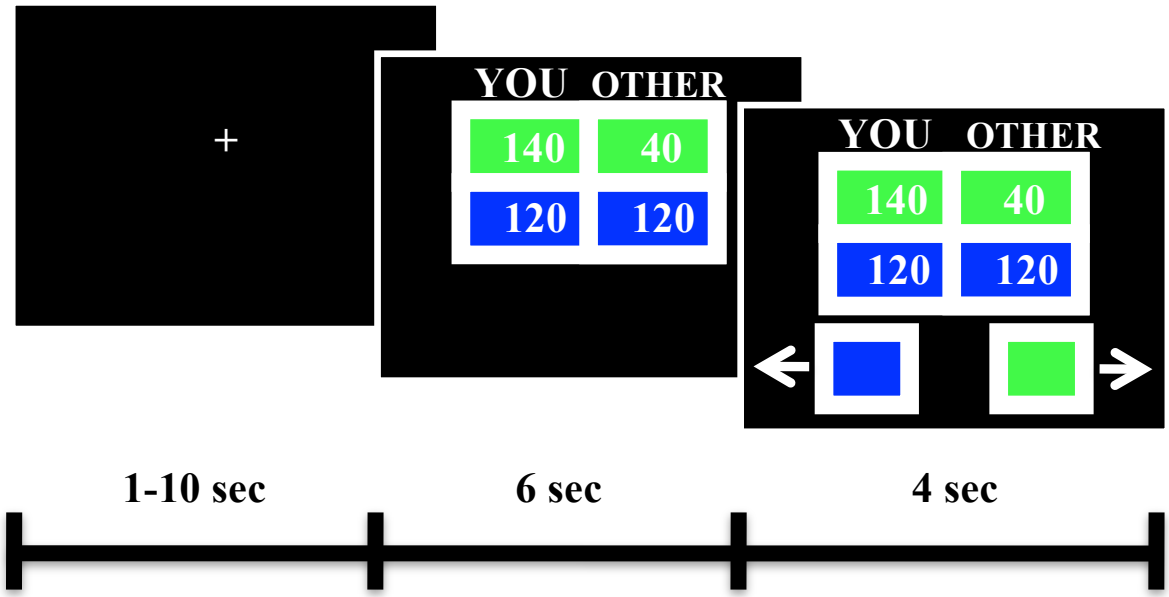

Figure 2. Timing and Presentation of Allocation Choices

The *political treatment* began with a political survey. Subjects were first asked their affiliation as Democrat, Republican, Independent, or None of the Above. The next question asked subjects to refine their political leanings: "strong" or "moderate" for party affiliates, "closer to Democratic" or "closer to Republican" for Independents and None of the Above. Subjects were then asked their opinions on five issues dividing the political spectrum in the United States at that time,[22] as well as on media outlets and religious

21. The online Appendix describes the procedure and the information subjects received about the other participant's answers to survey questions. In all other ways the matching is anonymous, and the recipient could be from another session of the experiment.

22. Abortion, illegal immigration, size of government, gay marriage, and repeal of the Bush tax cuts.

service attendance. Subjects were then placed into the Democrat group (containing all Democrats and "closer to Democratic" subjects) or the Republican group (containing all Republicans and "closer to Republican" subjects). Subjects were given (true) information on similarity and differences in answers to survey questions. Subjects allocated income in three types of pairings, YOU-OWN, YOU-OTHER, and OWN-OTHER, with exactly the format as in the minimal group treatment. Below for shorthand, we refer to the relevant pairings as POL You-Own and POL You-Other.

For each kind of pairing in each condition, subjects were randomly presented 26 different 2x2 allocation matrices. The Appendix provides the collection of matrices, and Figure 2 provides an example. The rows within each matrix were randomized, and the colors of the rows (blue or green), as well as the left and right keys, were all randomized.

These matrices were constructed following Fehr & Schmidt (1999) and Charness & Rabin (2002) and choices have the following interpretation. Consider *i*'s choice in a normalized matrix $\begin{bmatrix} \pi_i & \pi_j \\ \pi_i' & \pi_j' \end{bmatrix}$, where *i* earns weakly more in the top row than the bottom. The choice of the top row is consistent with being "selfish." Choosing the bottom row, the subject sacrifices own income and exhibits preferences for: (1) "inequity aversion" if $|\pi_i' - \pi_j'| < |\pi_i - \pi_j|$, (2) "maximizing total income" if $\pi_i' + \pi_j' > \pi_i + \pi_j$, (3) "dominance-seeking" if $\pi_i' - \pi_j' > \pi_i - \pi_j$.[23] A choice could involve more than one objective; in Figure 2, a subject who picks the bottom row would both increase total income and increase equity. Our structural estimation below distinguishes these motives.

In addition to the show-up fee of $6, subjects received payment for one choice selected at random from each of the three conditions—non-group, minimal group, and political group. Following the protocol of the lab, the choices were translated into dollars, and subjects earned about $15 for a one-hour session.

Before analyzing the data, we discuss possible experimenter demand effects.

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23. Previous literature has used some different terminology, e.g., total income maximizing has been called "social welfare maximizing" and "dominance-seeking" has been called "spitefulness" and "competitiveness." We choose total income maximizing since the utility function below is concerned only with the income, and not utility, of others, and we choose dominance-seeking since it describes a subject who wants to decrease another subject's income relative to his own (whereas "competitiveness" in many economic settings leads to efficiency and alternatives such as "inequity loving" do not indicate the direction of the inequity).

Subjects might think experimenters are emphasizing groups and act according to what they think experimenters expect. There are several responses to this concern. First, real-world actors create, highlight, and exploit group divisions, and the aim of this experiment, following a long tradition in social psychology, is to see how people behave in such circumstances. Second, if there is a demand effect, there is apparently no common understanding as to what the demand is; many subjects do not differentiate between in-group and out-group, and among those that do, there is heterogeneity in behavior. Finally, if there is a demand effect *per se*, we control for it when comparing the political and the minimal group treatments.[24] Some might argue that the political group treatment would have a higher demand effect, but the political treatment is also more salient by design. If there is such a differential, again there is little commonality among subjects as to the differential demand, and indeed a main result is that for Democrats there is only a small difference between behavior in minimal group and in political group treatments.

IV. Income Allocations in the Raw Data

This section provides an overview of subjects' choices in the experiment. We simply look at differences in the allocation of income to own vs. other group participants.[25] We consider the full sample, then separately Democrats and D-Independents.

< Table 1 about here. >

Table 1 gives the breakdown of the subjects by political party and leanings according to the political treatment survey. Just under half are Democrats (48%) and only 13% are Republicans. Independents and None of the Above make up more than one third of subjects (39%). Of these subjects, 62% are Democratic-leaning, whom we label "D-Independents." As stated above, we only compare Democrats and D-Independents below since (1) they are observationally equivalent in political positions and related

24. As discussed above, the order of the treatments was randomized, and empirically there is no difference between subsets of subjects who received the political group treatment first and those who received the minimal group treatment first.

25. In addition to the study of the raw data below, we conducted a factor analysis of subjects' choice data which shows (1) subjects make consistent choices on matrices that are shown, by the analysis, to be similar, (2) subjects have heterogeneous choice patterns, and (3) subjects are sensitive to the losses in own income when choosing allocations. The model and analysis are available upon request.

demographics (see Appendix), and (2) there are too few Republicans and Republican-leaning subjects to give power to our statistical tests.[26]

Consider the following measure of bias: In each group treatment g, for each subject i, take each matrix m faced by agent i, m={1,…,26}, and the choice of π_j when j is in i's group versus when j is in the other group. The difference, $\Delta_i(m)$, is positive when i gives more to the subject in his group for that matrix. In each group treatment g, for each subject i the average of these differences yields an individual statistic we call *favoritism*: $d_i(g) = \frac{1}{26}\sum_m \Delta_i(m)$. We consider the distributions of favoritism for each group treatment, for all subjects, for Democrats, and for D-Independents.

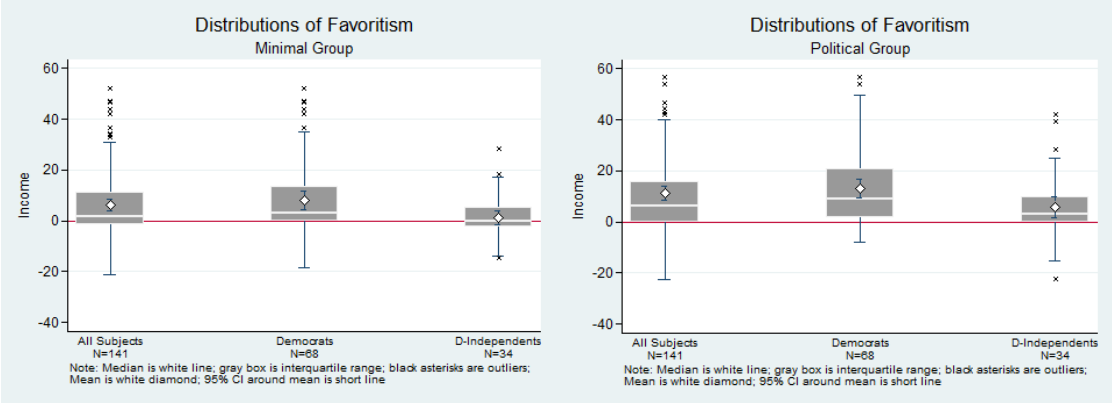


Figure 3. Distributions of Favoritism: All Subjects, Democrats, D-Independents

< Tables 2 and 3 about here. >

Figure 3 provides box and whisker plots of the medians, interquartile ranges, and outliers. Superimposed are white diamonds for the means and the 95% confidence intervals around the means; the means and standard errors are reported in Table 2 and mean comparisons are in Table 3.

The left panel of Figure 3, for the minimal group treatment, illustrates our main findings: (a) for All Subjects and for Democrats, the bias is driven in large part by

26. The subject pool appears to be representative of the Duke University community. Overall the majority (by at least 10 percentage points) of North Carolina's population is Democratic or "leans" Democratic, with a concentration of Democrats in the region where Duke is located (http://www.gallup.com/poll/114016/state-states-political-party-affiliation.aspx). Nationally this age cohort is largely Democratic (http://www.people-press.org/2011/11/03/the-generation-gap-and-the-2012-election-3/). The distribution of our subject pool also matches the political spectrum of undergraduates at Princeton, which has a similar undergraduate program and is the one peer institution for which we could find survey data (http://www.dailyprincetonian.com/2008/11/04/21969/).

outliers, but (b) for D-Independents, there is no bias, with virtually the same amounts given to participants in own and other group. Precisely, for All Subjects, both the median and mean are positive, 1.6 and 6.38 respectively, with the mean significantly different than zero. The mean is higher than the median, pulled up the many outliers who allocate between about 30 and 55 more to in-group participants than to out-group participants. For Democrats the median and mean favoritism is 3.08 and 8.14 respectively, and many subjects are outliers with high levels of favoritism. D-Independents, on the other hand, have a median of zero and mean favoritism of 1.38, which is not significantly different than zero, and a tight interquartile range. Table 3 compares the means for Democrats and D-Independents, with a t-test rejecting that they are same.

The right panel of Figure 3 gives the distributions for the political condition, showing marginally higher favoritism for both Democrats and D-Independents, but with similar pattern. The Democrats' median favoritism is 8.85 with a mean of 13.19, while for D-Independents the median is 3.08 with a mean of 5.83. Both means are significantly different than zero, and Table 3 shows the differences in means is significant. Table 3 also shows that, for both Democrats and D-Independents, the mean favoritism in the political group is significantly higher than the respective means for the minimal group. However, t-test fails to reject that the absolute increase in mean for the Democrats from minimal to political group (5.05) is greater than the increase for the D-Independents (4.45). The higher favoritism Democrats exhibit in the political treatment is thus arguably not due the salience of the group but the effect of group treatments per se.

V. Structural Estimation of Social Preferences

This section estimates the distributions of social preferences, giving a structural counterpart to the distributions of favoritism from the raw data. We first replicate Chen & Li's (2009) results on average social preferences for the full sample in the minimal group—subjects are (more) inequity averse towards (in) out-group. The estimations for the political group have the same pattern. Second, we consider average social preferences for Democrats and for D-Independents. Third, we estimate individual social preferences to construct the distributions behind these averages. The findings all support the patterns in the raw data. In the minimal group treatment, Democrats, but not D-Independents, have different social preferences towards the out-group. Furthermore, in

both group treatments, nearly half of subjects are not inequity averse or income maximizing towards the out-group, rather they are selfish or dominance seeking.

V.A. *Utility Function*

Suppose an individuals i's utility is some function of own and the other's income: $U_i(\pi_i, \pi_j)$. To allow for a range of social preferences including dominance-seeking, and for continuity with previous studies, we adapt the specification of Fehr & Schmidt (1999), Charness & Rabin (2002) and Chen & Li (2009). Utility derives from π_i and the divergence between own and other's income, $(\pi_i - \pi_j)$, depending on whether $\pi_i \geq \pi_j$ or the reverse. Let

$$U_i(\pi_i, \pi_j) = \beta_i \pi_i + \rho_i(\pi_i - \pi_j)r + \sigma_i(\pi_j - \pi_i)s \ ,$$

where β_i is the weight on own income, ρ_i is the weight on income difference when $\pi_i \geq \pi_j$, r is an indicator variable for $\pi_i \geq \pi_j$, σ_i is the weight on income difference when $\pi_i < \pi_j$, and s is an indicator variable for $\pi_i < \pi_j$.[27]

$\beta_i > 0$	$\sigma_i = 0$	$\sigma_i > 0$	$\sigma_i < 0$
$\rho_i = 0$	*Selfish*	*Total Income Max** *if* $\beta_i - \sigma_i > 0$	*Inequity Averse/ Dominance Seeking*
$\rho_i < 0$	*Inequity Averse/ Total Income Max** *if* $\beta_i + \rho_i > 0$	*Total Income Max** *if* $\beta_i + \rho_i - \sigma_i > 0$	*Inequity Averse*
$\rho_i > 0$	*Dominance-Seeking*	*Inequity Loving ***	*Dominance-Seeking*

* The weights on π_i and π_j are not necessarily the same, but since marginal utility is always positive for both own and other's income, a person with such parameters would opt for an allocation that is higher in either or both. This would not be the case for other sets of utility function parameters.

** If $\rho_i > 0$ and $\sigma_i > 0$, then an individual is "inequity loving" in that utility always increases when inequality increases, whether i's income is higher than j's income or vice versa.

Figure 4. Social Preferences as Combinations of Utility Function Parameters

Combinations of utility function parameters yield the motives discussed above, as seen in Figure 4 above. Given $\beta_i > 0$, if $\rho_i = \sigma_i = 0$ then an individual places no weight on

27. While this function is simple and captures social preferences described in the literature, it is linear and thus does not allow for diminishing marginal utility in π_i or $(\pi_i - \pi_j)$. To correct for this, we also conduct our analysis for polynomial specifications of $U_i(\pi_i, \pi_j)$. This estimation, available upon request, yields more precise parameter estimates, but does not qualitatively change the distributions of social preferences.

π_j; he is then *(purely) selfish*. If $\rho_i < 0$ and $\sigma_i > 0$ and $\beta_i + \rho_i - \sigma_i > 0$, utility is always increasing in both π_i and π_j, which corresponds to *total income maximizing*. If $\rho_i < 0$ and $\sigma_i < 0$, an individual is *inequity averse*, since utility is always increasing when π_i and π_j are closer together. If $\rho_i > 0$ and $\sigma_i < 0$, then utility always increases when i's income rises relative to j's income, which corresponds to *dominance seeking*.

V.B. *Estimation of Average Social Preferences*

We first estimate utility function parameters on average; that is, we assume there is a single set of utility function parameters for all individuals. We estimate a binary choice model for choosing the bottom row in each normalized matrix. Assuming an extreme value distribution for the error terms yields the well-known logit model, which we estimate for each condition/match by maximizing the following likelihood function:

$$L(\beta,\sigma,\rho) = \prod_{i=1}^{141}\prod_{m=1}^{26}\Lambda_{ki}(\beta,\sigma,\rho|\pi_i,\pi_j)^{b_{mi}}\left(1-\Lambda_{ki}(\beta,\sigma,\rho|\pi_i,\pi_j)\right)^{1-b_{mi}} \qquad (1)$$

where $\Lambda_{mi}(\beta,\sigma,\rho) = exp(U_{mi}^{bot} - U_{mi}^{top})/\left(1+exp(U_{mi}^{bot} - U_{mi}^{top})\right)$ and

$$(U_{mi}^{bot} - U_{mi}^{top}|\beta,\sigma,\rho) = \begin{pmatrix} \beta(\pi_{i,m}^{bot} - \pi_{i,m}^{top}) + \\ \rho\left(\left(\pi_{i,m}^{bot} - \pi_{j,m}^{top}\right)\cdot r^{bot} - \left(\pi_{i,m}^{bot} - \pi_{j,m}^{top}\right)\cdot r^{top}\right) + \\ \sigma\left(\left(\pi_{i,m}^{bot} - \pi_{j,m}^{top}\right)\cdot s^{bot} - \left(\pi_{i,m}^{bot} - \pi_{j,m}^{top}\right)\cdot s^{top}\right) \end{pmatrix}.$$

Tables 4, 5, and 6 give the parameter estimates for the control and group treatment in-group and out-group matches for All Subjects, for Democrats, and for D-Independents, respectively.[28]

< Tables 4, 5 and 6 about here. >

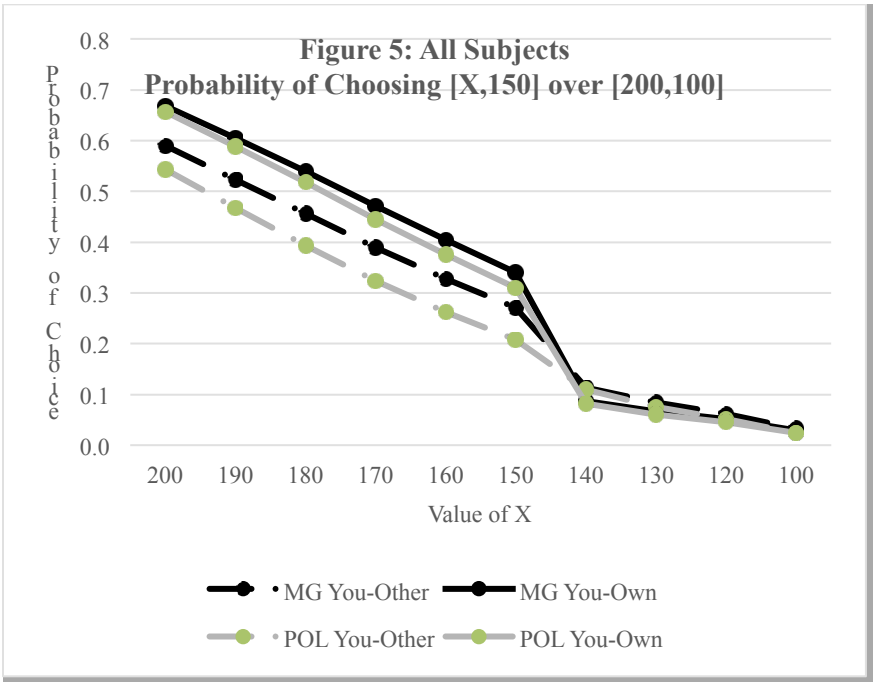
Table 4 replicates the findings of Chen & Li's (2009). The parameter estimates are given in panel A; on average, subjects are inequity averse and show an in-group bias, with greater inequity aversion towards in-group than out-group in both minimal group and political treatments. The Wald tests in panel B show that we can reject that

28. Charness and Rabin (2002) and Chen and Li (2009) restrict β to be equal to one and measure ρ and σ relative to β. The logit model is identified up to a scale parameter, that is $var(\varepsilon)=s^2\pi^2/3$ where s is a scale parameter. By restricting β=1, they estimate this scale parameter and how it changes across conditions. We take the more traditional approach in labor economics of setting s=1 and estimating β. If the variance is the same across conditions, then changes in β give changes in marginal utility of own income. However, since the logit model is only identified to a scale parameter, the alternative interpretation of changes in β is differences in the variance of the error which is reflected in β as we restrict all scale parameters to 1.

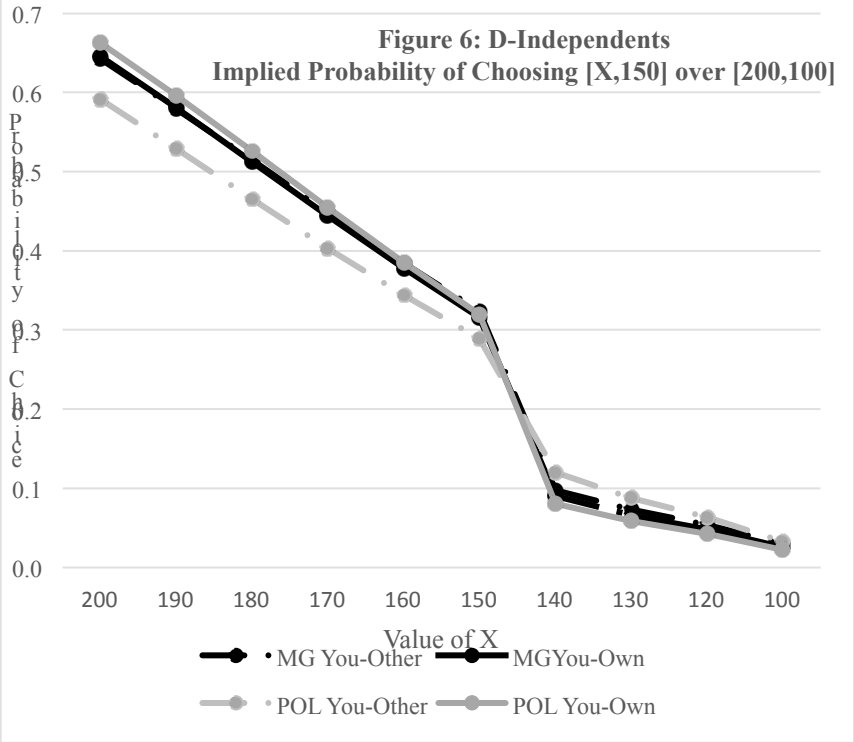
participants have the same social preferences across all conditions/pairings except for the comparison MG You-Own vs. POL You-Own.

Tables 5 and 6 shows that Democrats have the same pattern as All-Subjects, but D-Independents do not. Statistically, D-Independents have the same social preferences in the control, and in MG You-Own, and in MG You-Own (see Table 6 panel B for Wald tests). In the political treatment, D-Independents are on average more inequity averse towards the in-group.

To see whether the parameters suggest a meaningful differences in behavior across conditions/pairings, we perform a simulation exercise. Consider a matrix $\begin{bmatrix} 200 & 100 \\ X & 150 \end{bmatrix}$ where X ranges from 200 to 100. Figure 5 shows, for All Subjects, the probability of a subject choosing the bottom row in different conditions/pairings for different values of X as implied by the estimated parameter values. For example, the probability of choosing [150,150] over [200,100] is 34% when the recipient is an in-group member in the minimal group condition and falls to 21% when the recipient is an out-group member in the political condition. The plots show this gap is consist for X between 150 and 200.



We then conduct this simulation to contrast the implied behavior of Democrats and D-Independents. Because our subject pool is dominated by Democrats, the implied behavior of a Democratic subject is qualitatively similar to All-Subjects. The implied behavior of D-Independents is quite different, as shown in Figure 6. In particular, unlike Democrats, in the minimal group treatment D-Independents pick the bottom matrix at the same rate for in-group and out-group subjects.



V.C. *Estimation of Individual Social Preferences and Distributions of Social Preferences*

Here we study individual social preferences and construct social preference distributions for each treatment/pairing. In most experiments, and here, individual-specific parameters cannot typically be estimated, since each subject would need to make more decisions than is feasible in an experimental setting to yield precise estimates.[29] As a compromise strategy, we estimate different *types*, where each type has distinct preferences. We then use each subject's actual choices to calculate the posterior probability that the subject is a certain type in each condition/pairing.

29. Other researchers studying social preferences have calibrated the extent to which individual utility functions match canonical forms. For seminal papers, see Andreoni & Miller (2002) and Fisman, Kariv, & Markovits (2007).

Formally, our method follows: Our design generates panel data (multiple choices for each individual), and thus it is possible to estimate a finite mixture model (a.k.a. latent class model). A mixture model allows for a finite number of types in the population, where each type t is characterized by parameters $(\beta_t,\rho_t,\sigma_t)$, and each type t is a proportion of the population p_t, where $\sum_t p_t = 1$. We estimate four types, i.e., four sets of utility parameters $(\beta_1, \rho_1,\sigma_1)$, $(\beta_2, \rho_2,\sigma_2)$, $(\beta_3, \rho_3,\sigma_3)$, $(\beta_4, \rho_4,\sigma_4)$, and four proportions (p_1, p_2, p_3, p_4). Let μ denote the full set of utility parameters and proportions. We choose four because it is the minimum number that could capture four distinct motives. We find estimation of five or more types does not yield qualitatively more information for the purposes of our analysis.[30] While we estimate four types, it is important to emphasize that it is the data that yields the utility parameters and proportions of each type. That is, there is no presumption, a priori, that the types map into the four motives outlined above.

If each individual's type were known, we could estimate a binary choice model for choosing the bottom row in each matrix for individuals of type t. Assuming an extreme value distribution for the error terms, as above, the parameters could be estimated for type t individuals by maximizing:

$$L(\beta_t, \sigma_t, \rho_t) = \prod_{i=1}^{141}\prod_{m=1}^{26} \Lambda_{mi}(\beta_t, \sigma_t, \rho_t|\pi_i, \pi_j)^{d_{mi}} \left(1 - \Lambda_{mi}(\beta_t, \sigma_t, \rho_t|\pi_i, \pi_j)\right)^{1-d_{mi}} \quad (2)$$

where $\Lambda_{mi}(\beta_t, \sigma_t, \rho_t)$ and $\left(U_{mi}^{bot} - U_{mi}^{top}|\beta_t, \sigma_t, \rho_t\right)$ are defined analogously to (1). Since we do not know each individual's type, we condition on an individual being a type and then sum over the distribution of types. That is, for four types, we estimate

$$L(\mu) = \prod_{i=1}^{141}\prod_{m=1}^{26}\prod_{t=1}^{4} p_t\Lambda_{mi}(\beta_t, \sigma_t, \rho_t|\pi_i, \pi_j)^{d_{mi}} \left(1 - \Lambda_{mi}(\beta_t, \sigma_t, \rho_t|\pi_i, \pi_j)\right)^{1-d_{mi}}, \quad (3)$$

where (p_1, p_2, p_3, p_4) is estimated along with the utility parameters for each type.[31]

Having estimated the model, it is straightforward to calculate the *posterior* probability that a particular subject i is type t. Under the estimated parameters and given the choices that i actually made, the probability of making those choices if i is type t is

30. As shown in the online Appendix, the five-type estimation divides one of the types into two sub-types, while the other three have the same parameter estimates and mixing proportions.

31. To insure that $0 \le p_t \le 1$ for all t, the mixing distribution is specified as a logistic function with a constant. That is, three constants, θ_1 , θ_2, and θ_3 are estimated and the probability of being of type 1 is then calculated as $\exp(\theta_1)/(1+\exp(\theta_1)+\exp(\theta_2)+\exp(\theta_3))$ and similarly for the probability of being type 2 or 3.

$$\Gamma_t(\beta,\sigma,\rho)=\prod_{k=1}^{26}\Lambda_{tk}\left(\beta_t,\sigma_t,\rho_t\mid\pi_i,\pi_j\right)^{d_{ki}}\times\left(1-\Lambda_{tk}\left(\beta_t,\sigma_t,\rho_t\mid\pi_i,\pi_j\right)^{(1-d_{ki})}\right).$$

Using Bayes' rule with the estimated mixing proportions p_t as priors of being type t, the posterior probability that i is type t is just

$$P_t=\frac{p_t\Gamma_t(\beta,\sigma,\rho)}{\sum_{t=1}^{4}\Gamma_t(\beta,\sigma,\rho)}\ .$$

We then categorize individuals as type t based on their posterior probability of being type t. In particular, we assign i type t if $P_t=max\{P_1\ldots P_4\}$.[32]

< Tables 7, 8 and 9 about here. >

While the methodology is different, the results confirm the findings of previous studies of social preferences (Andreoni & Miller (2002), Fisman, Kariv & Markovits (2007)) that most individuals are well-described by a small set of distinct utility types.[33] Table 7 gives the results of the parameter estimation for four types and the corresponding proportions of the population for the control; mapping the parameter values to the typology in Figure 4, the four types are "selfish" (25%), "total income maximizers" (36%), "inequity averse" (34%), and "dominance-seeking" (5%). Table 8 gives the result of categorizing each subject as a type in the control by the posterior probabilities. The first column gives the number of subjects classified as each type when a subject is classified to a type if it is the type with the largest posterior probability. The second column gives the mean posterior probability of subjects assigned to the type, with the third column giving the standard deviation. To give statistical confidence to each categorization, we construct a 90% confidence interval for each individual[34] and in column 4 only include individuals in our count of subjects of each type if with 90% confidence or above the subject is that type. Of the 141 subjects in our experiment, 138

32. For ease of exposition, we present the results where each individual is assigned a type based on the highest posterior probability. All the results below hold when individuals are characterized by a weighted average of types, using individual posterior probabilities for each type (available upon request).

33. We also conduct goodness of fit tests (available in the online Appendix) that show the results of the mixing model fits the data much better than the estimates of average social preferences.

34. To do this, we used the fact that the asymptotically, the parameter distribution is normal with an expected value equal to the estimated parameters and an expected variance-covariance matrix equal to the estimated one. We therefore drew 1,000 sets of parameters from this distribution, calculating the type that each subject's data suggested under each parameter draw. Someone was then classified as a specific type if in at least 900 out of the 1000 set of parameter values the subject's original assignment occurred.

in the control are assigned to a specific type with greater than 90% confidence. The best estimated types are selfish and dominance-seeking; all 35 subjects categorized as selfish and all 7 subjects categorized as selfish had at least a 90% probability of being of that type. Total income maximizers and inequity averse types are just a bit less precisely assigned, due to the fact that these types exhibit closer behavior. Using the same type estimates, Table 9 provides the subject type classifications for the MG You-Other, indicating again the precision of the classifications.[35]

< Tables 10 and 11 about here. >

With these subject classifications, we return to our questions about biases in social preferences—in-group versus out-group. We compare the distributions of types for each condition/pairing, first for all subjects, and then separating out Democrats and D-Independents. For all subjects, Table 10 shows more dominance-seeking and selfish subjects for You-Other pairings than for the control or for You-Own pairings. Moreover, in You-Other pairings, nearly half of all subjects are neither inequity averse nor total income maximizing. In MG You-Other, 30% are selfish and 16% are dominance seeking; in POL You-Other, these percentages rise to 35% and 21% respectively. Table 11 reports the Chi-squared tests for the differences in these distributions.

< Tables 12, 13, 14, and 15 about here. >

Tables 12, 13, 14, and 15 show the distributions for Democrats and D-Independents. For Democrats, for the minimal group treatment, the distributions for You-Own is significantly different than the distribution for You-Other. The proportion of subjects who are selfish is almost the same (26% vs. 29%). The proportions of inequity averse and total income maximizing subjects is somewhat smaller (29% to 22%, 38% to 29%, respectively). The largest difference is the proportion of subjects who are dominance-seeking in MG You-Own vs. MG You-Other (6% vs. 19%). The differences in the type distributions for the political treatment shows a similar, stronger pattern.

35. An alternative method would estimate new utility function parameters for each condition-match. Rather than hold the specification of utility functions constant, this alternative would allow the utility parameters for each estimated type to change across conditions. The results, available upon request, are qualitatively similar to what is presented in the paper.

For D-Independents, in contrast, the minimal group treatment does not change the distribution of types at all. By the Chi-square tests, we cannot reject that the distributions for the MG You-Own and MG You-Other are the same, and for each of these we cannot reject they are the same as the Non-Group control. In particular, there is no increase in the percentage of subjects who are dominance seeking. The political treatment, however, does show such an increase (as well as other small changes in the distribution), and we can reject that the distributions are the same.

VI. Groupy vs. Non-Groupy Subjects

In this section, we return to the full sample (including Republicans and R-Independents) and take another cut at the data to identify the subjects who exhibit little to no group bias. While many of these subjects are D-Independents, the box and whisker plots of favoritism and the distributions of individual social preferences indicate that many other subjects also do not change their allocations according to group.

< Tables 16 about here. >

We consider each subject's type in each condition/match and consider those subjects who do not switch their utility-type across condition/matches of the experiment. Since the conditions are meant to capture the impact of group divisions, we call the subjects who change type "groupy" and those who do not change type "non-groupy." We first look at the minimal group condition and ask how many subjects, with 90% confidence, have the same type for You-Own and You-Other pairings, and how many subjects, with 90% confidence, have a different type. Table 16 shows the cross-tabulation of the 123 subjects that satisfy one of these criteria. Thirty-seven subjects are groupy, and 86 subjects are “non-groupy,” given by the count of the subjects on and off the diagonal respectively. The diagonal shows that subjects who are selfish in You-Own pairings tend to be selfish in You-Other pairings, and all subjects who are dominance-seeking in You-Own pairings are dominance seeking in You-Other pairings. For the off-diagonals, many subjects who are inequity averse for You-Own pairings become dominance-seeking or selfish in You-Other pairings, and subjects who maximize total income for You-Own pairings switch to another type for You-Other pairings.

To fully distinguish between “groupy” and “non-groupy” subjects, we consider increasingly stronger criteria for non-responsiveness to experimental conditions. The

above criterion—90% confidence of no change in type between MG You-Own and MG You-Other—is our weakest criterion. A moderate criterion is that a subject does not change types with 90% confidence across minimal group and political group conditions. The strongest criterion is that the subject does not change types with 90% confidence across all conditions of the experiment. Table 17 provides the numbers of subjects classified in these ways.[36] The first column shows that 61% percent of total subjects (86 out of 141) satisfy the weakest criterion for non-groupy, 40% satisfy the moderate criterion, and 34% of the subjects satisfy the strongest criterion. The second column gives the corresponding numbers of groupy subjects, defined similarly.

< Table 17 about here. >

With these slices of the subject pool, we return to our raw-data measure of bias—"favoritism" in allocation of income—for another way to see the difference in behavior of groupy and non-groupy subjects. For the minimal group and the political group

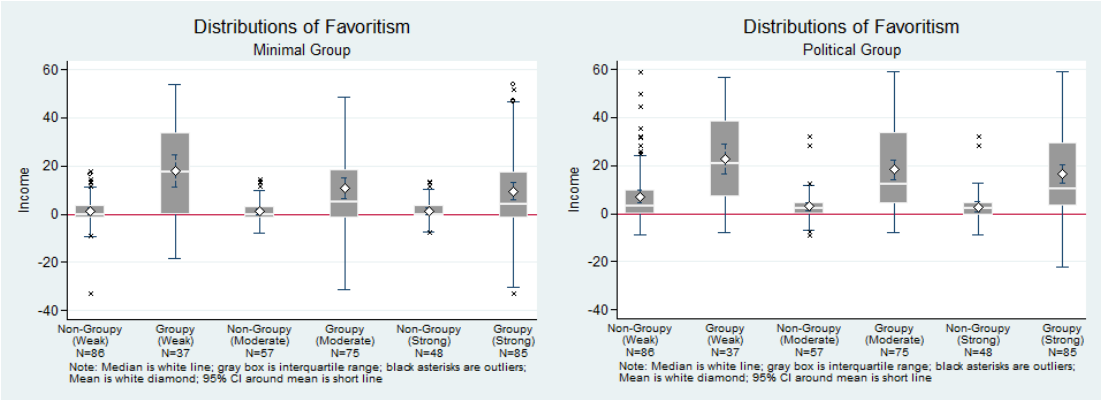


Figure 7. Distributions of Favoritism: Non-Groupy Subjects, Groupy Subjects

< Table 18 and 19 about here. >

conditions, Figure 7 gives favoritism distributions for "non-groupy" vs. "groupy" subjects according to the weak, moderate, and strong criteria (moving from left to right in each panel). Table 18 provides the means and t-tests. Figure 7 and the mean comparison show that the different criteria for "non-groupy" yield similar results. Furthermore, in the left

36. To construct these subsets, we performed an extension of our Monte Carlo bootstrap described above. We draw from the parameter distribution where the parameters and variance covariance matrix are estimated from in the control. For each draw, we classify each subject using the subject's choices in each condition, scoring whether the individual is classified the same or not for each condition. A subject is considered to be non-groupy if for at least 900 out of 1000 draws from the parameter distribution the subject has the same classification. A subject is considered to be groupy if at least 900 out of 1000 draws the subject is classified differently between in and out group.

panel showing the minimal group treatment, almost all "non-groupy" subjects show no favoritism; the means and medians are near zero, with little spread. Groupy subjects, on the other hand, almost all show favoritism, and there is a large spread, with many subjects exhibiting high levels. Both patterns hold for the political group treatment, with a slight difference that non-groupy subjects exhibiting small positive levels of favoritism. Table 19 provides the differences in means for the strongly defined non-groupy vs. groupy subjects and show the differences in mean favoritism are significant.

To take another tack at the different behavior of groupy vs. non-groupy subjects, we study response times. We ask whether groupy subjects make decisions more slowly, possibly indicating they pay attention to the designations YOU-OWN vs. YOU-OTHER which appear above the choice matrices (as shown in the screen shots in Figure 2). We consider subjects who are selfish in the POL You-Other matches. We hypothesize groupy subjects take more time to make these selfish POL You-Other decisions since they would need to take note of the identity designations above the matrix to adjust their choices.

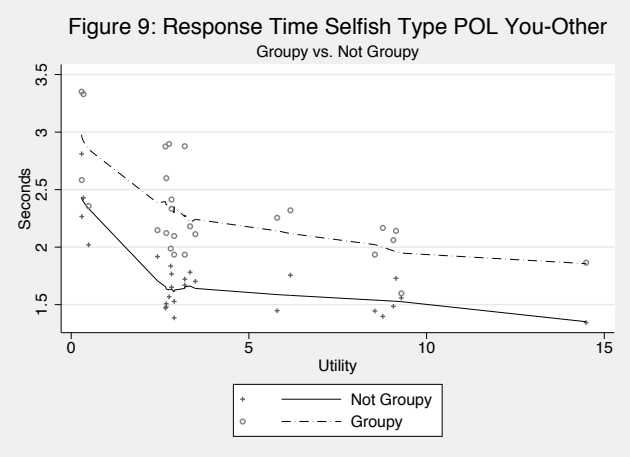


Figure 9 and calculations of mean response times show our hypothesis is correct. The Figure displays the average time it takes for subjects classified as selfish in POL You-Other to make their choices for each matrix, contrasting groupy and non-groupy subjects (moderate criterion). The x-axis gives the utility difference between the two rows in a matrix computed from the social preference parameters, and the y-axis gives time in seconds.[37] Non-groupy subjects choose allocations on every matrix faster than

37. The downward slope of both plots illustrates a well-known relationship from cognitive psychology—the smaller the utility differential between two options, the longer it takes to make a decision.

groupy subjects. Overall, for these choices, the mean response time for non-groupy subjects is 1.7 seconds and the mean response time for groupy subjects is 2.3 seconds, which are significantly different at well above the 1% level ($t = 7.8$).

< Table 20 about here. >

Finally, we consider individual characteristics that could relate to individual groupiness. For example, groupiness could vary by sex or ethnicity. Church going, political party affiliation, and distrust of strangers could be correlated with groupiness. Lower socioeconomic status could be associated with groupiness. For the latter, while we do know subjects' family wealth or income, we can consider parents' education as a proxy. For the 133 subjects classified as groupy or non-groupy by the strong criterion, Table 20 presents these demographics and possible correlates. Sex and African American compositions of groupy and non-groupy subjects are nearly identical; non-groupy subjects are less likely to be born in the United States but this difference is not statistically significant. Groupy subjects are not more likely to distrust strangers and not significantly more likely to attend church. Non-groupy subjects are significantly more likely to be politically independent (given the high fraction of Democrats in the sample, this implies they are also less likely to be Democrats). Non-groupy subjects are more likely to have lived with both parents and have a mother with an advanced though these differences are not statistically significant. Non-groupy subjects are significantly more likely to have highly educated fathers—62% had fathers with a masters degree or higher while only 44% of groupy individuals have fathers with advanced degrees.

VII. Conclusion

From the sandlot, where a friendly pick-up game can turn into a brawl, to the public square where a democracy movement can turn into a civil war, people form groups that alternatively coalesce or conflict. This experiment studies individual behavior in group settings. It builds on the long history of experiments in social psychology on group conflict and on the established literature in economics on social preferences. The experiment strips away social interactions, punishments, collective benefits and other dynamics that might drive people to help or hurt others in different groups. The simplicity of the task places the focus on individuals' underlying predispositions. With a new design and methods, the paper asks whether individuals themselves may be more or

less prone to treat people differently, and whether individual identities and the personal salience of groups relate to their treatment of others.

In the experiment, subjects choose allocations of income to self and others. Each subject allocates income in a control and two group settings—minimal group and political group—in both own-group pairings and out-group pairings. We study the differences in amounts of income given to in-group and out-group subjects. Using a finite mixture model, we estimate social preferences allowing for distinct types of social preferences and classify individual subjects as types.

The results reveal systematically different responses to group treatments. For the subject pool as a whole, there are significant average group treatment effects. However, analysis of the raw data and structural estimation of individual social preferences indicate that many subjects do not exhibit out-group bias, while a subset shows considerable bias in allocation of income. Democrats exhibit bias in both the minimal group and political group treatments. Not so for D-Independents, who have same politics but are not members of the political party. D-Independents do not change their behavior in the minimal group setting, adopting a bias only in the political setting. While the paper studies groups and social preferences, the methods we develop are general and pave the way to study individual heterogeneity and its sources in any economic context.

The results call for a richer model of bias—one that includes individual characteristics and predilections as key variables. The results speak to the remarkable variety of human behavior in situations of group conflict. While some people actively engage in wars and disputes, sacrificing their lives or livelihoods, there are others who seek ways to profit. In the midst of genocides, there are people who risk everything to protect others from harm. The experiment gives statistical evidence for possible sources of this heterogeneity—individual differences in basic social preferences, individual differences in predispositions towards groups, and differential attachment to groups related to individual identities. Future research will investigate psychometric, demographic, and cultural correlates of groupy vs. non-groupy behavior.

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TABLES

Table 1. Distribution of Subjects' Political Affiliations and Leanings

SURVEY CATEGORY	% OF SUBJECTS
Democrat – Strong	15
Democrat – Moderate	33
Republican – Strong	0
Republican – Moderate	13
Independent – Dem leaning	13
Independent – Rep leaning	10
None of the Above – Dem leaning	11
None of the Above – Rep leaning	5

Table 2: Mean Favoritism: All Subjects, Democrats, D-Independents

Subset	Mean Favoritism MG	Mean Favoritism POL
All Sample (N=141)	6.38***	11.31***
	(1.22)	(1.35)
Democrats (N=68)	8.14***	13.19***
	(1.85)	(1.89)
D-Independents (N=34)	1.38	5.83***
	(1.39)	(2.15)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 3: Comparisons of Mean Favoritism, t test

Comparison	Difference in Mean Favoritism
Dem MG v. D-Ind MG	6.76**
	(2.81)
Dem POL v. D-Ind POL	7.35**
	(3.08)
Dem MG v. Dem POL	5.05***
	(1.64)
D-Ind MG v. D-Ind POL	4.45**
	(1.67)
(Dem MG – Dem POL) v. (D-Ind MG – D-Ind POL)	-0.60 (2.61)

Notes: Standard errors in parentheses; ***p<0.01,**p<0.05, * p<0.1

Table 4: All Subjects Average Utility Function Estimates

A. Utility Function Parameters

	Non-Group	Minimal Group		Political Group	
Utility Function Parameters		You-Own	You-Other	You-Own	You-Other
Beta	0.0436***	0.0420***	0.0344***	0.0412**	0.0336***
	(0.00168)	(0.00164)	(0.00148)	(0.00163)	(0.00146)
Rho	-0.0112***	-0.0130***	-0.00728***	-0.0140***	-0.00342***
	(0.000655)	(0.000679)	(0.000588)	(0.000674)	(0.000573)
Sigma	-0.00247**	-0.00288**	-0.00629***	-0.00168	-0.0108***
	(0.00124)	(0.00126)	(0.00129)	(0.00123)	(0.00136)
Observations	3,636	3,650	3,645	3,652	3,640

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

B. Wald Tests of Differences in Utility Parameters

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	10.81	**
Minimal Group You-Other	27.85	***
Political Group You-Own	28.36	***
Political Group You-Other	110.70	***
Minimal Group		
You-Own vs. You-Other	47.33	***
Political Group		
You-Own vs. You-Other	212.14	***
Minimal Group You-Own vs.		
Political Group You-Own	4.27	
Minimal Group You-Other vs.		
Political Group You-Other	39.96	***

Table 5: Democrats Average Utility Function Estimates

A. Utility Function Parameters

	Average Utility Function Parameters by Condition/Match				
	Non-Group	Minimal Group		Political Group	
Utility Function Parameters		You-Own	You-Other	You-Own	You-Other
Beta	0.0440***	0.0406***	0.0327***	0.0398***	0.0368***
	(0.0024)	(0.0023)	(0.0021)	(0.0023)	(0.0022)
Rho	-0.0109***	-0.0119***	-0.0054***	-0.0132***	-0.0019**
	(0.0009)	(0.0010)	(0.0008)	(0.0010)	(0.0008)
Sigma	-0.0011	-0.0004	-0.0065***	0.0017	-0.01116***
	(0.0018)	(0.0018)	(0.0019)	(0.0018)	(0.0020)
Observations	1755	1760	1755	1759	1750

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

B. Wald Tests of Differences in Utility Parameters

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	4.94	
Minimal Group You-Other	26.77	***
Political Group You-Own	16.65	***
Political Group You-Other	79.79	***
Minimal Group		
You-Own vs. You-Other	36.43	***
Political Group		
You-Own vs. You-Other	148.47	***
Minimal Group You-Own vs.		
Political Group You-Own	3.63	
Minimal Group You-Other vs.		
Political Group You-Other	25.78	***

Table 6: D-Independents Average Utility Function Estimates

A. Utility Function Parameters

	Average Utility Function Parameters by Condition/Match				
	Non-Group	Minimal Group		Political Group	
Utility Function Parameters		You-Own	You-Other	You-Own	You-Other
Beta	0.0430***	0.0395***	0.0381***	0.0421***	0.0328***
	(0.0034)	(0.0032)	(0.0032)	(0.0034)	(0.0029)
Rho	-0.0107***	-0.0120***	-0.0117***	-0.0135***	-0.0074***
	(0.0013)	(0.0013)	(0.0013)	(0.0014)	(0.0012)
Sigma	-0.0052**	-0.0061**	-0.0054**	-0.0049*	-0.0096***
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0027)
Observations	876	880	880	882	882

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

B. Wald Tests of Differences in Utility Parameters

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	3.19	
Minimal Group You-Other	4.20	
Political Group You-Own	5.08	
Political Group You-Other	6.97	*
Minimal Group You-Own vs. You-Other	0.15	
Political Group You-Own vs. You-Other	13.96	***
Minimal Group You-Own vs. Political Group You-Own	0.76	
Minimal Group You-Other vs. Political Group You-Other	8.18	**

Table 7. Results from Mixture Model—Control

	Parameter Estimates and Proportions for Four Types versus Population				
Utility Function Parameters	Type 1	Type 2	Type 3	Type 4	Population
Beta	0.152***	0.0655***	0.0312***	0.0367***	0.0436***
	(0.0134)	(0.00441)	(0.00310)	(0.00980)	(0.00168)
Rho	-0.00372	-0.0144***	-0.0214***	0.0528***	-0.0112***
	(0.00254)	(0.00157)	(0.00138)	(0.0106)	(0.000655)
Sigma	0.00489*	0.00544**	-0.00747***	-0.0439***	-0.00247**
	(0.00287)	(0.00240)	(0.00240)	(0.0169)	(0.00124)
Observations	3,636	3,636	3,636	3,636	3,636
Mixing Proportion	25 %	36 %	34 %	5 %	100%
Preferences Implied by Parameters	SELFISH	TOTAL INCOME MAX	INEQUITY AVERSE	DOMINANCE SEEKING	INEQUITY AVERSE

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 8. Individual Type Classifications: Control

Posterior Probability of:	Obs.	Mean	Std. Dev.	Obs > LB 90% CI
SELFISH (Type 1)	35	0.966	0.051	35
TOTAL INCOME MAX (Type 2)	52	0.932	0.096	50
INEQUITY AVERSE (Type 3)	47	0.971	0.067	46
DOMINANCE (Type 4)	7	1.00	0.000	7
All Types	141	0.958	0.077	138

Table 9. Individual Type Classifications: Minimal Group You-Other

Posterior Probability of:	Obs.	Mean	Std. Dev.	Obs > LB 90% CI
SELFISH (Type 1)	42	0.964	0.096	41
TOTAL INCOME MAX (Type 2)	30	0.823	0.141	22
INEQUITY AVERSE (Type 3)	47	0.957	0.103	44
DOMINANCE (Type 4)	22	0.960	0.116	19
All Types	141	0.940	0.118	126

Table 10. Distribution of Types, by Condition and Match
ALL SUBJECTS

PANEL A: NON-GROUP

Type	Freq.	Percent
SELFISH	35	25
TOTAL INCOME	52	37
INEQUITY AVERSE	47	33
DOMINANCE	7	5
Total	141	100

PANEL B: MINIMAL GROUP

	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	40	28	42	30
TOTAL INCOME	38	27	30	21
INEQUITY AVERSE	57	40	47	33
DOMINANCE	6	4	22	16
Total	141	100	141	100

PANEL C: POLITICAL GROUP

	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	42	30	50	35
TOTAL INCOME	26	18	18	13
INEQUITY AVERSE	71	50	43	31
DOMINANCE	2	1	30	21
Total	141	100	141	100

Table 11. Chi-Squared Test of Differences in Distribution of Types
ALL SUBJECTS

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	3.55	
Minimal Group You-Other	14.30	***
Political Group You-Own	16.80	***
Political Group You-Other	33.64	***
Minimal Group		
You-Own vs. You-Other	11.09	**
Political Group		
You-Own vs. You-Other	33.71	***
Minimal Group You-Own vs.		
Political Group You-Own	5.79	
Minimal Group You-Other vs.		
Political Group You-Other	5.10	

Table 12. Distribution of Social Preferences, by Condition and Match
DEMOCRATS

PANEL A: NON-GROUP		
	YOU-OTHER	
Type	Freq.	Percent
SELFISH	15	22
TOTAL INCOME	27	40
INEQUITY AVERSE	21	31
DOMINANCE	5	7
Total	68	100

PANEL B: MINIMAL GROUP				
	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	18	26	20	29
TOTAL INCOME	20	29	15	22
INEQUITY AVERSE	26	38	20	29
DOMINANCE	4	6	13	19
Total	68	100	68	100

PANEL C: POLITICAL GROUP				
	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	18	26	26	38
TOTAL INCOME	14	21	11	16
INEQUITY AVERSE	34	50	15	22
DOMINANCE	2	3	16	24
Total	68	100	68	100

Table 13. Distribution of Social Preferences, by Condition and Match
D-INDEPENDENTS

PANEL A: NON-GROUP		
	YOU-OTHER	
Type	Freq.	Percent
SELFISH	9	26
TOTAL INCOME	11	32
INEQUITY AVERSE	12	35
DOMINANCE	2	6
Total	34	100

PANEL B: MINIMAL GROUP				
	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	11	32	9	26
TOTAL INCOME	5	15	10	29
INEQUITY AVERSE	16	47	13	38
DOMINANCE	2	6	2	6
Total	34	100	34	100

PANEL C: POLITICAL GROUP				
	YOU-OWN		YOU-OTHER	
Type	Freq.	Percent	Freq.	Percent
SELFISH	12	35	12	35
TOTAL INCOME	5	15	1	3
INEQUITY AVERSE	17	50	16	47
DOMINANCE	0	0	5	15
Total	34	100	34	100

Table 14. Chi-Squared Tests of Differences in Distribution of Types in Condition/Match WITHIN DEMOCRATS

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	1.96	
Minimal Group You-Other	7.72	*
Political Group You-Own	8.75	**
Political Group You-Other	16.51	***
Minimal Group		
You-Own vs. You-Other	6.37	*
Political Group		
You-Own vs. You-Other	21.08	***
Minimal Group You-Own vs.		
Political Group You-Own	2.79	
Minimal Group You-Other vs.		
Political Group You-Other	2.96	

Table 15. Chi-Squared Tests of Differences in Distribution of Types in Condition/Match WITHIN D-INDEPENDENTS

Comparison	Test Statistic	*** P-Val < 0.01 ** P-Val < 0.05 * P-Val < 0.10
Non-Group vs.:		
Minimal Group You-Own	3.02	
Minimal Group You-Other	0.09	
Political Group You-Own	5.54	
Political Group You-Other	10.62	**
Minimal Group		
You-Own vs. You-Other	2.18	
Political Group		
You-Own vs. You-Other	7.70	*
Minimal Group You-Own vs.		
Political Group You-Own	2.07	
Minimal Group You-Other vs.		
Political Group You-Other	9.39	**

Table 16. Cross Tabulations of Individual Subjects
90 Percent Confidence of Type Assignment on/off Diagonal
Minimal Group

		Minimal Group You-Other				
		SELFISH	TOTAL INC	INEQUI	DOMIN	Total
Minimal Group You-Own	SELFISH	34	3	1	0	38
	TOT INC MAX	3	12	8	4	27
	INEQUITY A	4	4	36	10	54
	DOMIN	0	0	0	4	4
	Total	41	19	45	18	123

Table 17. Number of Non-Groupy and Groupy Subjects
by Weak, Moderate, Strong Criteria
90% Confidence of Assignment

	Non-Groupy	Groupy	Total Classified	Total Subjects
Weak Criterion (MG You Own = MG You Other)	86	37	123	141
Moderate Criterion (MG You Own = MG You Other= POL You-Own = POL You Other)	57	75	132	141
Strong Criterion (MG You Own = MG You Other= POL You-Own = POL You Other= NG)	48	85	133	141

Table 18. Mean Favoritism Groupy and Non-Groupy Subjects Minimal Group and Political Group

Subsample	Mean Favoritism MG	Mean Favoritism POL
All Subjects N= 141	6.28 (1.22) ***	11.31 (1.35)***
Non Groupy - Weak Criterion N=86	1.10 (0.66)	7.04 (1.35)***
Non-Groupy -Moderate Criterion N= 57	1.17 (0.61)*	2.88 (0.93)***
Non-Groupy- Strong Criterion N=48	1.19 (0.65)*	2.70 (1.07)**
Groupy - Weak Criterion N = 37	17.86 (3.41)***	22.69 (3.15)***
Groupy - Moderate Criterion N=75	10.74 (2.11)***	18.26 (2.08)
Groupy - Strong Criterion N=85	9.52 (1.90)***	16.33 (1.95)***

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 19: Comparison of Mean Favoritism in Income Allocations Groupy vs. Non-Groupy (Strong Criterion)

Comparison	Difference in Mean Favoritism
Groupy MG v. NonGroupy MG	-8.33*** (2.59)
Group POL v. NonGroupy POL	13.63*** (2.72)

Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 20: Demographics
Groupy vs. Non-Groupy (Strong Criterion)

	Groupy (N=85)	Not Groupy (N=48)	P-Val
Female	65%	65%	0.98
African American	19%	19%	0.99
Born in United States	85%	78%	0.32
Mostly Distrust Strangers	68%	69%	0.95
No Religious Attendance	23%	29%	0.42
Political Party			
Republican	14%	13%	0.44
Democrat	54%	40%	0.11
Political Independent *	32%	48%	0.06
Lived with Both Parents	74%	83%	0.22
Mother Advanced Degree	35%	46%	0.24
Father Advanced Degree **	48%	69%	0.02

Appendix

Instructions to Participants

PAGE 1

WELCOME!

INSTRUCTIONS

Thank you for participating in this experiment. The object of this investigation is to study how people make decisions. There is no deception in this experiment – and we want you to understand everything about the procedures. If you have any questions at any time, please ask the experiment organizer in the room.

PART I: THE CHOICE TASK

A) During the experiment, you will be presented with a series of choices. For each choice, you will be asked to award points to between either (1) yourself and another participant or (2) two other participants. You will earn the points you allocate to yourself, and the other person will earn the points you allocate to him or her. At the end of the experiment, one of your choices will be selected at random by a computer and the points earned will be converted into payments.

Each decision is independent from the others. Your decisions and outcomes in one choice will not affect your outcomes in any other choice. For each choice, you will be paired with new participants.

Use LEFT and RIGHT arrow keys to make your choices.

PART II and III:

A) INITIAL SURVEY
You will take a brief survey. There are no right or wrong answers. Your answers to these questions will not affect your payments. Please only use the RIGHT and LEFT arrow keys or NUMBER keys as instructed to answer all questions.

B) THE CHOICE TASK
After completing the initial survey, you will once again be presented with a series of choices. You will be anonymously paired with two new participants. These participants will remain the same throughout this part of the experiment. At the end of the experiment, one of your choices will be selected at random by a computer and the points earned will be converted into payments. Each decision is independent from the others. Your decisions and outcomes in one choice will not affect your outcomes in any other choice.

TURN PAGE OVER FOR ADDITIONAL INSTRUCTIONS

PAGE 2

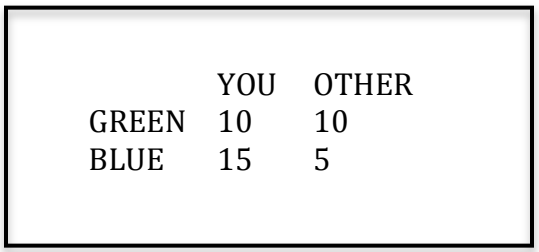
PAYMENT

At the end of the experiment, the points you get will be converted into money by a predetermined conversion factor. This money will be added to your $6 participation payment and given to you at the end of the experiment. Since we want you to focus on completing the experiment and not calculating points to money conversions, we will not inform you of the conversion factor. However, we expect participants to earn between $12 and $18, with an average of $15.

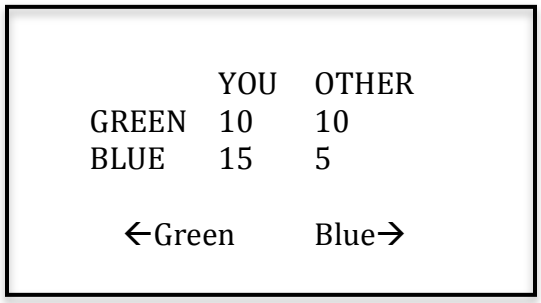
SETUP

You will make all choices on a computer screen. You will make approximately 200 choices.

For each choice, you will see a screen that presents the two different points allocations you can make.



After a one second pause, two arrows will appear so you can pick which allocation you prefer. You can press either 'LEFT' or 'RIGHT' arrow keys on the keyboard to match the arrows presented on the screen. Please only touch the RIGHT or LEFT arrow keys for all choices.



Are there any questions? Press any key to begin.

Table A1. Normalized Matrices and Social Objectives

A. Matrices where $\pi_i \geq \pi_j$ in both rows, ordered by $\Delta\pi_i/(\Delta\pi_i - \Delta\pi_j)$

Matrix Number	(π_i, π_j) (π'_i, π'_j)		Social Objective	$\Delta\pi_i/(\Delta\pi_i - \Delta\pi_j)$
14	140	100	Dominance	-2
	100	40		
12	140	100	Dominance	-1.5
	80	0		
16	140	100	Dominance	-0.5
	120	40		
19	140	140	Dominance	-0.5
	120	80		
15	140	100	Dominance	-0.25
	120	0		
18	140	140	Dominance	-0.16
	120	0		
1	100	100	Dominance	0
	100	20		
7	140	20	Inequity Aversion/ Total Income Max	0.2
	120	100		
9	140	40	Inequity Aversion/ Total Income Max	0.2
	120	120		
10	140	60	Inequity Aversion/ Total Income Max	0.33
	120	100		
11	140	80	Inequity Aversion/ Total Income Max	0.33
	120	120		
21	160	0	Inequity Aversion/ Total Income Max	0.375
	100	100		
5	120	80	Inequity Aversion	0.5
	100	100		
22	160	40	Inequity Aversion	0.5
	120	80		
25	200	0	Inequity Aversion	0.5
	100	100		
26	200	0	Inequity Aversion	0.5
	180	20		
8	140	40	Inequity Aversion	0.6
	80	80		
17	140	120	Inequity Aversion	3
	80	80		
13	140	100	None	NA
	80	40		

B. Matrices where $\pi_i < \pi_j$ in at least one rows ordered by $\Delta\pi_i/(\Delta\pi_i - \Delta\pi_j)$

Matrix Number	(π_i, π_j) (π'_i, π'_j)		Social Objective	$\Delta\pi_i/(\Delta\pi_i - \Delta\pi_j)$
3	100	200	Inequity Aversion/ Dominance	0
	100	100		

4	100	200	Inequity Aversion/ Dominance	0
	100	140		
2	100	140	Dominance	0
	100	60		
6	140	0	Inequity Aversion/ Total Income Max	0.125
	120	140		
23	160	80	Inequity Aversion/ Total Income Max	0.2
	140	160		
20	140	140	Total Income Max	0.33
	120	180		
24	160	120	Total Income Max	0.33
	140	160		

Table A2. Demographics and Political Opinions of Democrats and D-Independents

Demographics & Distribution of Answers to Political Survey (in fractions)	**Democrat** (N=68)	**D-Independent** (N=34)	**T-test of Difference**
Fraction Female	0.72	0.65	0.756
Fraction White	0.40	0.32	0.718
Fraction Asian	0.32	0.44	1.161
Attends religious services at least once a week:			
No	0.81	0.82	0.178
Yes	0.19	0.18	
Would you have less Social Security & Medicare for smaller government :			
No	0.82	0.79	0.356
Yes	0.18	0.21	
Bush Tax Cuts Should be:			
Allowed to Expire	0.78	0.88	1.256
Made Permanent	0.22	0.12	
Abortion Should be:			
Generally Available	0.73	0.62	1.214
Under Stricter Control	0.24	0.35	1.252
Not Available	0.03	0.02	0.000
Gay Marriage Should be:			
Legally Recognized	0.75	0.79	0.491
Civil Unions Only	0.16	0.12	0.588
Not Recognized	0.09	0.09	0.000
Arizona Immigration Law:			
Goes Too Far	0.63	0.68	0.435
Is About Right	0.35	0.29	0.589
Does not Go Far Enough	0.02	0.03	0.501