The Value of Groups

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Abstract

We present the results of an experiment that attempts to measure the social value of groups. In the experiment, agents interact with insiders and outsiders in trust games and periodically enter markets where they can trade group membership. We found that trust fell when there were groups because of negative discrimination against outsiders. Against this, however, there is evidence that group membership is the source of a psychological benefit, albeit one that may induce social inertia. Overall, the welfare effects of groups are at best neutral and could be negative, pointing to the potential perverse effects of group-based social capital.

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1. Introduction

People belong to groups. Groups vary enormously. Some are religious, others are ethnic. Some arise from family or kinship ties, others from work, shared interest, or a political commitment. Equally a person's attachment to their group can be strong or weak and the sense in which one can be said to choose to belong to a group varies greatly. Notwithstanding these nuances and complexities, group membership, broadly understood, is a ubiquitous feature of economic and social life. Perhaps somewhat surprisingly, economists have not been, at least until recently, especially interested in how belonging to a group affects an individual.

There are notable exceptions to this inattention. First, it has long been recognized that groups might form around a collective action problem and so secure, often sectional, benefits for their members (see Olson, 1965). Second, and more recently, groups have been cast as a form of social capital because they allow members to trust each other in ways that non-members do not. As a result, exchanges between group members are thought to incur smaller transaction costs (i.e. waste fewer resources) than would otherwise be the case (e.g., see Fukuyama, 1995 and the Economic Journal symposium, 2002).

These benefits from group membership are material in character. In contrast, there is the further thought that group membership can be a source of a separate and distinctive kind of psychological benefit. Akerlof and Kranton (2000), for instance, suggest that simply being able to identify with a group is itself an important source of individual well being. The growing interest in neurobiology lends support to this idea because there is evidence that being a member of group produces an endorphin rush (see Dunbar, 2006). The idea also has a famous lineage in economics with Smith (1759/1976) arguing in a similar fashion that people enjoy the fellow feeling, the

'special pleasure of mutual sympathy', as he put it, that comes from belonging to a group.

In this paper, we investigate experimentally the potential significance of the social capital and the psychological benefits of group membership on individual welfare. Both effects are intuitively plausible and they could have important implications for public policy. For example, in so far as groups have these effects on welfare then the cost-benefit evaluations of policies should (but typically do not at present) pay attention to how any policy influences the constellation of groups in society.

Both the social capital and the psychological benefits of group membership could arise through two conceptually distinct routes. There could be a 'pure' effect that comes from belonging to a group *per se* and an idiosyncratic influence which owes its character to the particular constitutive norms of the group in question. In natural groups the two effects combine and are difficult to disentangle. For this reason, we induce group membership artificially within the experiment. This avoids the pre-existing stereotypes or expectations that come with natural groups and the results are therefore more likely to distinguish what, if any, are the 'pure' effects of groups on behavior and welfare. This approach has a further advantage. Once the 'pure' effects of group membership have been identified, they can be used in the future to disentangle the two types of influence in natural groups. In other words, our results potentially form a baseline for future studies that attempt to identify the particular contribution that comes from an actual group's constitutive norms.

We test for the potential 'pure' group social capital effect by considering whether the existence of 'artificial' groups increases trust in a trust game experiment where subjects can belong to one of two groups. The use of a trust game provides a

direct connection to the literature on social capital. Our experiment differs in one key respect from related work on public goods games where there is some evidence that induced feelings of group identity have a positive effect on contributions (e.g., Cookson, 2000). In those studies, group feelings were encouraged in a context where there was only one potential group. We believe, however, that group feelings more commonly arise where there is more than one group and our experimental design reflects this.

The additional virtue of the two group frame is that it allows us to explore an important question about whether any difference in trust between insiders and outsiders comes from positive discrimination in favor of insiders or negative discrimination against outsiders. Both forms of discrimination would produce a difference between interactions with fellow members as compared with those involving non-members, but while the former would make group creation a genuine type of social capital formation in the sense that the existence of groups improved welfare, the latter would make groups a form of negative social capital because their existence actually lowers welfare. In our experiment, there is a difference in trust in between insiders and outsiders and we find that it arises because of negative discrimination against outsiders. Thus, contrary to what seems to be the presumption in the social capital literature, the existence of groups in our experiment tangibly reduces trust in the aggregate and so is welfare reducing.

We examine the possible additional psychological benefits of group membership by introducing an experimental market into the play of the trust game. In this market subjects can trade group membership. This trading opportunity provides an incentive compatible mechanism for assessing the value that individuals place on group membership. This can then be used to generate estimates of the extent to which

they value group membership for psychological or non-material reasons (that is, for reasons beyond the material effects that arise from the influence of groups on the level of trust). People do attach positive value to group membership, we find, beyond what would be expected from the material effects of groups. By combining this positive psychological effect with the negative social capital result, we estimate the net social value of groups as being at best roughly neutral or possibly negative depending on how the psychological benefit is interpreted.

Section 2 sets out the experimental design. Section 3 presents the results, section 4 discusses them and we conclude the paper in section 5.

2. Experimental Design

2.1 Outline and Stage 1

The experiment was conducted between March and June 2006 at our university.[3] Apart from the experimental instructions and a control questionnaire, the experiment was fully computerised. Subjects were all university students. A total of 188 subjects participated in the 16 sessions: we scheduled 12 subjects per session, but one session was run with 8 subjects due to no-shows.

Subjects were randomly seated in the laboratory. Computer terminals were partitioned to avoid communication by facial or verbal means. Subjects read the experimental instructions and answered a control questionnaire, to check understanding of the instructions, before proceeding with the tasks. Experimental supervisors individually advised subjects with incorrect answers in the questionnaires. The experimental instructions had a neutral frame (e.g., did not refer to 'trust',

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[3] The experimental instructions are provided in an electronic appendix at [address omitted for this double blind version].

'trusters' or 'trustees'). The experiment used 'experimental points' as currency, each worth 4 UK pence (0.04 pounds).

There were four experimental treatments: baseline (B), color group assignment (C), group segregation (SG), group segregation and incentives (SI). Each session was divided in four stages. We had planned 3 sessions in the B treatment and 4 sessions in each of the others, which required more statistical power because of the need to discriminate intra-group and inter-group behavior. To compensate for the fact that one session with 8 subjects was run in the SG treatment, we ran a 5th session in this treatment.

Stage 1 had three rounds and was common to all treatments. Each round was a standard Berg et al. (1995) basic trust game. The truster (the 'First Mover') received 24 experimental points and had to decide how many points (if any) to give to the other person and how many (if any) to keep. All the points given were multiplied by a *conversion rate* equal to 3 before they were received by the trustee (the 'Second Mover'). The trustee then decided how much (if any) to keep and how much (if any) to return to the truster. Subjects were matched randomly and anonymously each round, with the constraint that they would hold the role of truster and that of trustee at least once.[4] The only information they received was about their round coplayer's decision and about their own round earnings; for example, in treatments with groups (C, SG and SI), they had no information about the color group of coplayers. The key purpose of stage 1 was to provide subjects practice and experience with trust games. We now move on to the specifics of each treatment. For the sake of clarity, the flow of the experiment is represented in Table 1.

(Insert Table 1 about here.)

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[4] They were asked to make decisions within 1 minute and a half, and a small clock on the computer display informed them of how much time they had. In practice, however, they could take more, though they rarely did.

2.2 The Baseline (B) Treatment

In the B treatment stages 2, 3 and 4 were very similar to stage 1. Each stage had six rounds rather than three. As in stage 1, each round consisted of the basic trust game, but at the start of each round 48 points were given to trusters rather than 24. To mirror the information provided in stages 2, 3 and 4 of the other treatments (as described below), the computer screen displayed information on average giving rate and average return rate, with a summary table on average giving and return rates from stage 2 onwards being provided at the end of each stage. Each stage was otherwise identical to stage 1.

Between stages there was a two minutes waiting period, at the start of which subjects were paid an additional 48 points: again, this was meant to mirror the other treatments, both by providing the same money amounts and by creating a temporal wedge between trust games tasks.

2.3 The Color Group Assignment (C) Treatment

At the start of the experiment subjects were randomly assigned to either the Blue group or the Red group; six participants were assigned to each group.[5] Stages 2 through 4 were divided into two phases.

Trust games phase. In stages 2, 3 and 4 subjects played six trust games as in stage 1, but with the following differences. Each round trusters were allocated 48 points rather than the 24 of stage 1. They were randomly matched with coplayers within their group for three rounds out of six, and with coplayers from the other group for the remaining three rounds; they were told in the experimental instructions that this would be the case[6]. In each round they were informed whether the coplayer

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[5] A similar minimal group manipulation has been used by Hargreaves Heap and Varoufakis (2002).
[6] It is possible that, in addition to an effect associated with being a member of the blue or red group, people also experience a sense of belonging to the group formed by being part of the same experiment. This effect should *reduce* any discrimination between blue and red (sub-)groups (since they would be

belonged to the blue group or to the red group, though they were not told their identity[7]. They were assigned at least once the role of trusters and at least once that of trustees with respect to both insiders and outsiders. They were provided, on a round-by-round basis, with a table containing information on average giving rates and average return rates by members of each group with respect to insiders and outsiders (see Figure 1): that is, from blue group to blue group members, from blue to red, from red to blue and from red to red.

(Insert Figure 1 about here.)

In addition, they received a summary table with average giving and return rates for each stage from the second onwards by members of each group with respect to insiders and outsiders.

Market for groups phase. Before stages 2, 3 and 4 of the trust games were played, subjects had an opportunity to change color groups provided there was a trader belonging to the other group willing to swap places at a mutually acceptable price. We introduced this phase because, in principle, market mechanisms supply an incentive compatible mechanism for eliciting individual valuations and in practice there is evidence that when they are repeated some of the well known experimental decision anomalies notably diminish (see Cox and Grether, 1996 and Shogren et al., 2001).[8]

In particular, subjects were given an endowment of 48 points and first asked to state whether, if they could choose which group to be and both options were free, they

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moderated by the belonging of all coplayers to the same experiment) and so make any discrimination that we actually find the more convincing.

[7] Although anonymity should make each interaction a one-shot game, it is possible that people falsely believe they are engaging in a repeated game where they can influence a coplayer's future behavior through their own behavior now. We controlled for this by ensuring that the likelihood of playing with the same person again is approximately the same with C treatment insiders (1 out of 11 for any given round, in sessions with 12 subjects), C treatment outsiders (1 out of 12) and B treatment coplayers (again, 1 out of 12). Note that this effect, if present, would operate by inducing positive rather than negative discrimination.

[8] Thanks to Graham Loomes who suggested this mechanism to us.

would rather stay in their group or switch to the other. If he or she stated they would rather switch, then they became a potential buyer for the membership of the other group and they were asked how much they were willing to pay to swap places with a member of the other group. They could state any value between 0 and 48 points, the value of her endowment. Using this method we measured the WTP of agents, with a common upper limit of 48 points chosen to avoid bankruptcy problems or the dependence of the WTP range on previously earned money.

Similarly, if the subject stated they would rather stay, they became a potential seller of group membership and he or she was asked to state how much they would need to be paid by a member of the other group in order to swap places, again with a an upper limit of 48 points. Subjects were also given the option to state that they were not willing to switch group at any price within the allowed range (0 to 48 points). Using this method we obtained information on the WTA of agents.

The market then operated as a Walrasian clearinghouse, where the price was set so that the number of sellers was equal to the number of buyers of membership of the other group. Whenever there was a range of possible market-clearing prices, the lowest market-clearing price was chosen. Crucially, the mechanism only operated by swapping players between groups, so that each group remained with six subjects throughout the experiment.[9]

2.4 The Group Segregation (SG) Treatment

This treatment was exactly as the C treatment but with one difference designed to pick up on the way that members of groups often interact more frequently with each other than with outsiders. In evolutionary game theory this is referred to as 'associative' matching and has been used to explain how cooperation occurs within

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[9] Or four players, in relation to the one session with eight subjects. Subjects were told that they should make their market decisions within four minutes.

groups but not between them (see Bergstrom, 2002). Specifically they played twice as frequently with insiders than with outsiders. In each stage they were matched four times with insiders (twice as trusters, twice as trustees) and only two times with outsiders (once as trusters and once as trustees). Subjects were informed about this in the initial experimental instructions.[10]

2.5 The Group Segregation and Incentives (SI) Treatment

This treatment was the same as SG except that we introduced an element of material competition between the groups. Again this variation was designed to introduce a feature that is sometimes present in inter-group relations and we implemented it through a variable multiplication factor for gifts. If blue trustees had been given more in a given stage, all points given to them were multiplied by 4 and those given to red trustees were multiplied by 2. If red trustees had been given more, all points given to them were multiplied by 4 and those given to blue trustees were multiplied by 2.[11]

This incentive structure was a trust game adaptation of the marginal incentive scheme present in the public good literature on team competition (Tan and Bolle, 2006). For comparability with the literature on team competition,[12] which provides the natural benchmark, we chose incentives to be a function of round (rather than, say, stage or session overall) performance. The incentive structure could induce large disparities in winnings between groups, which, in principle, could have then been picked up by markets for groups in later stages.

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[10] Another possible source of difference between behavior in C and SG arises when anonymity does not have the effect of people treating interactions as a one-shot game (see footnote 7). In these circumstances, we might expect that the greater the relative repetition with insiders than outsiders should encourage positive discrimination (though not negative discrimination) and so increase the gap between how insiders and outsiders are treated in SG as compared with SI.

[11] Subjects were told that, if blue and red trustees received the same, the group that got their points multiplied by 4 rather than by 2 was chosen at random. In practice, though, a tie never occurred in the experiment.

[12] See, for example, Nalbantian and Schotter (1997), Bornstein et al. (2002) and Tan and Bolle (2006).

2.6 Payments

Each session lasted a little over one hour. The average earning was 12.21 UK pounds per subject (approximately 22-23 US dollars). Payment was based on the earnings from each of the markets (or of the waiting periods for the B treatment) plus those from a randomly chosen round from each of the four stages.[13] Subjects were privately paid and left the laboratory one at a time in an order designed to minimize the likelihood of seeing each other.

3. Experimental Results

3.1 Behavior in Trust Games

Let the *giving rate* be the fraction of the endowment given by trusters to trustees, and let the *return rate* be the fraction of the amount given by trusters which is returned by the trustees to the trusters. Figure 1 and Table 1 show the average giving and return rates in each experimental treatment.

(Insert Figure 2 and Table 2 about here.)

Stage 1 is, of course, the practice stage common to all treatments, whereas stages 2 through 4 are differentiated across treatments and we find that introducing groups did not raise trusting behavior in the aggregate: the opposite happened. Although giving rates were roughly the same in all treatments in stage 1, their mean value in stages 2-4 was statistically significantly lower in all 13 of the sessions with colour groups (C, SG and SI treatments) than in the B sessions (Mann-Whitney P = 0.051).[14] Likewise, the mean return rates in the B sessions are statistically significantly higher than those in the color sessions (Mann-Whitney P = 0.014). There

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[13] Since stage 1 had 3 rounds and 24 points given to trusters, and stages 2 through 4 had 6 rounds but double the number the points given to trusters, the marginal incentives were the same for each of the four stages.

[14] In this paper all reported P values are two tailed except where otherwise specified.

were no other statistically significant differences in mean giving or return rate among treatments in stages 2-4.

One problem with interpreting the difference in return rates between the baseline and group treatments is that subjects may simply return proportionally less because they have been given less. This might occur for a number of psychological motives which have been documented in other experiments, such as inequality aversion (Fehr and Schmidt, 1999), reciprocity (Falk and Fischbacher, 2001) or trust responsiveness (Guerra and Zizzo, 2004).

We ran random effects regressions with the stages 2-4 mean giving rate and the mean return rate by subject as dependent variables. The return rates regressions have Giving Rate received as the Second Mover as an independent variable: that is, the mean stages 2-4 giving rate the subject has received when playing as a trustee. This allows us to control for the positive relationship which we might expect between giving rate and return rate. In the regressions the random effects are at the session level and are introduced to take into account of the possible non-independence of observations by different subjects in the same session. We also introduce a number of variables to capture individual-specific heterogeneity: stage 1 giving and return rate, age, and dummies for gender (= 1 for women) and religious affiliation (Christian = 1, our largest religious affiliation, and AgnosticAtheist = 1 for agnostic or atheist subjects). There are also key dummy variables for the experimental treatment, using as a baseline the B treatment with no groups. In regressions 1 and 3 we employ dummy variables for each treatment of groups (C, SG and SI, = 1 for sessions in the C, SG and SI treatment respectively). However, the restriction that the coefficients on C, SG and SI are equal is not rejected (χ^2 = 2.21, P = 0.331, for the giving rate regression; χ^2 = 2.04, P = 0360, for the return rate regression). Regressions 2 and 4

accept this restriction and simply have a global dummy, Not B, equal to 1 for all group (i.e., not B) treatments.

The Giving Rate received when Second Mover is statistically significant ($P < 0.005$) in the return equation: subjects who receive more return proportionally more. This fits with previous findings on trust games. Some individual variables are significant: stage 1 giving is a strong predictor of stages 2-4 giving; stage 1 giving and returning is a predictor of stages 2-4 returning; women might be giving slightly less ($P < 0.06$); AgnosticAtheist is significant and positive.

Controlling for all these variables and for the random effects, the coefficients on the treatment dummies are all negative, suggesting that groups induce lower giving and returning. While each individual treatment dummy is statistically significant at, at the least, the 0.08 level (two tailed) in the giving rate regression 1, the dummy for the weakest group manipulation – C – is statistically insignificant in the return rate regression 3. In the regressions with the global dummy, being in a group treatment reduced the giving rate by about 16-17% ($P < 0.01$) and, conditional on the Giving Rate received as Second Mover, the return rate by about 4-5% ($P < 0.07$).

We can now summarize our first key results as follows:

RESULT 1: The creation of groups reduced mean giving rates. The minimal group inducement of the C treatment was sufficient to produce this result.

RESULT 2: The creation of groups reduced mean return rates. This is so in the stronger group treatment (SG and SI) even after controlling for the possible relationship between the giving rate received and the return rate.

In all the group treatments (C, SG and SI) we observe discrimination between insiders (i.e., members of the same group) and outsiders (i.e., members of the other group). In all the thirteen sessions the mean giving rate to a fellow insider is higher than to an outsider (Wilcoxon P = 0.001). In ten sessions out of thirteen, the mean return rate was higher when interacting with a fellow insider than with an outsider (Wilcoxon P < 0.01), though possibly with less across-treatment robustness.[15]

Figure 2 and Table 2 suggest that this difference in trust between insiders and outsiders arises because there is *negative* discrimination against outsiders. In particular, Table 2 shows that although there is a decrease in mean giving and return rate between insiders as compared with when there are no groups in the B treatment, this is not statistically significant.[16] whereas the larger drop in giving and return rates made to outsiders is statistically significant (P < 0.05). Thus, the advent of groups appears to have no effect on the giving rate observed among same group members as compared with what happens when there are no groups, but it does have an adverse effect on the giving rate observed between people who are not members of the same group.

Turning to the return rates, we again need to control for the fact that trustees will return proportionally less to trusters who have given them less: as a result, discrimination in giving may be sufficient to induce indirectly differences in return rates. Let DAvgGivingRate (DAvgReturnRate) be equal to mean giving (return) rate by a subject to insiders minus mean giving (return) rate by the same subject to outsiders. We ran random effects regressions on DAvgGivingRate and

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[15] Two of the three exceptions are among the five SG sessions; the one other exception belongs to the SI treatment.

[16] This is true even if we compare B treatment behavior with that in the C treatment – which has the largest drop – and we generously run the test by comparing average giving and return rate in the two treatments treating the value for each subject as an independent observation (rather than that for each session, as we instead generally do).

DAvgReturnRate. The results of these regressions, which control for possible session level random effects, are given in Table 4.

(Insert Table 4 about here.)

These regressions can only use data from stages 2-4 in the groups treatments, since elsewhere either there were no groups (B treatment) or subjects were not provided information on coplayers' groups (stage 1 of SG, SI and C treatments). We leave the meaning of and the interpretation of the results for psychological value variables to the next subsection.

The constant term is a key variable in these regressions because it picks up possible differences when dealing with insiders as compared with outsiders. The SG and SI dummies (defined as for the earlier regressions) are meant to capture whether the stronger group inducement of the SG and SI treatments make any difference to this discrimination. In regressions 7 and 8, 'Diff. in Trust Rate as a Second Mover' is equal to mean giving rate received as second mover from insiders *minus* mean giving rate received gifted as second mover from outsiders: therefore, it measures the degree of discrimination trustees have experienced as second movers, and this may indirectly in turn produce discrimination against outsiders due to reciprocity or some similar motivation. The regressions also contain the same set of demographical variables as regressions 1-4. Women seem to discriminate less in giving rates, and the coefficient on Age is negative and marginally significant ($P < 0.1$).

The regressions show evidence of discrimination in giving rates and that this indirectly produced discrimination in return rates. Controlling for the other variables and the random effects, the constant term in the discrimination in giving regressions 5 and 6 is significant and shows a baseline discrimination of around 30%. As the SG and SI dummies are statistically insignificant, minimal groups are sufficient to induce

discrimination and this is not altered by segregation (SG) or incentives (SI). The constant terms (and SG and SI) in regressions 7 and 8 are insignificant, while 'Diff. in Trust Rate as Second Mover' is statistically significant and quantitatively meaningful: 10% of discrimination in giving rates leads to around 2.5% discrimination in return rates.

RESULT 3: The creation of groups induced negative discrimination. The minimal group inducement of the C treatment was sufficient to produce this result.

3.2 Psychological Value

3.2.1 Estimation of the psychological value

We now consider what, if any, additional psychological value subjects placed on own group membership. The markets at the start of stages 2, 3 and 4 in the C, SG and SI treatments provided an incentive-compatible mechanism for the revelation of individual preferences for staying in one's own group (the willingness to accept, WTA, value) or for switching groups (the willingness to pay, WTP, value). As there were repeated markets, subjects also had the opportunity to gain experience both about the nature of the social commodity being traded (i.e. membership of a given group) and about the market mechanism itself.

WTA(own) is the positive price a subject needed to be paid to be willing to switch and WTP(own) is equivalent to a *negative* price on own group membership and so they reveal the value that an individual places on membership of his or her group.[17] We define the measure M1 as equal for each subject and market to WTA(own) or – WTP(own), whichever is the case. Suppose further that individuals

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[17] A price of zero was also a possibility, allowed by the experimental program in relation both to WTA and WTP valuations. Therefore, technically we always had a *non-negative* price (WTA(own)) or a *non-positive* price (WTP(own)), with one further qualification to be mentioned shortly.

hold a common expectation that members of group 'k' enjoys a material advantage of 'x' over members of the other group. It follows that if subjects enjoyed no non-material, psychological value from belonging to their group, then the individual M1 for each of the six members of 'k' should be equal to 'x' and '-x' for the six members of the other group; with the result that the average M1 is zero. In these circumstances, with one qualification noted below, the extent to which <u>average</u> M1 deviates from zero, is a measure of the additional average psychological value placed on own group membership. In other words, people on average are placing more (or less) value on own group membership than can be associated with its material effects and so reveal an additional psychological benefit (or cost) from belonging to their group.

One problem with the average M1 measure of the mean psychological benefit from own group membership is that subjects could state that they were not willing to lose their membership at any allowed price between 0 and 48 points. Roughly 9-10% of the choices were of this 'definite stay' kind (0.080, 0.085 and 0.109 in the C, SG and SI treatments, respectively). We opted for two routes to deal with this problem. M1 contains all observations, but conservatively introduces a valuation of 49 for these definite stays:[18] since the lower bound for valuations was – 48 (the budget), if anything, for $x > 49$, this introduces a downward bias. M1b simply omits 'definite stay' observations and also introduces a downward bias in average M1 estimates (larger than for M1a). Either way, in the light of possible downward biases, our

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[18] We chose the closest integer value to 48 in keeping with the experimental procedure, where for simplicity subjects could only provide integer valuations: therefore, 49 is the lowest value in keeping with this constraint. In terms of upward bias of psychological value estimates, the 'worst case scenario' for this modeling choice would be if all six agents had a true value of 48.001 and preferred not to round their valuation to 48; even in this stress case scenario, the implied upward bias would only be 0.5. In practice, none of our key results would change if we were to choose a value, say, of 48.001 for 'definite stay' cases.

average M1 estimates should be interpreted as conservative estimates of the psychological values involved.

The virtue of the <u>average</u> M1 measure of the psychological value placed on own group membership is that it does not depend on any precise method for forming expectations regarding the material value of being in one group rather than another. All that matters is that individual expectations are homogenous on this matter (see Appendix B). The <u>individual</u> revealed psychological values are, however, sensitive to the precise expectations regarding the material consequences of belonging to different groups and since we wish to run some regressions using individual psychological values, we make two possible assumptions here. For individuals, M2 is equal to M1 minus the expectation of the material gain from a switch when these expectations are formed adaptively (i.e. the expected relative material/gain is the same as that in the last stage for the markets at the start of stages 3 and 4, and to zero for the market at the start of stage 2 as no past information on relative group trustworthiness is then available); and M3 is equal to M1 minus the expectation of the material gain from a switch when these expectations are formed rationally (i.e. the expected relative material gain/loss is the same as actually occurs).

3.2.2 Results on psychological values

Table 5 depicts mean psychological values for each measure, treatment and stage, and Figure 3 provides illustrative histograms of the distribution of mean psychological values.

(Insert Figure 3 and Table 5 about here.)

In all sessions, and using any of the measures, we find that mean psychological values are above 0 (Wilcoxon P = 0.001). Figure 3 exemplifies the scale of the effect: only 12 out of 152 subjects had mean M1 values lower than 0, and

only 1 had a mean value lower than − 20. As subjects learn more about the task and the nature of the commodity, it is unsurprising that psychological value measures may become smaller, though the Spearman correlation between M1 (or M2, or M3, and so on as per Appendix B) and stage number is statistically insignificant (- 0.251, *n.s.* at 0.1 level).[19] In particular by stage 4, psychological value measures are still at least 18 points according to M1 (or equivalent measures) and at least 13 according to the measures that omit definite stayer observations.[20] Projected over the three stages, a psychological value of 13 or 18 implies a valuation of about 12.8% or 17.8% of mean experimental winnings for the sake of own group membership.[21] The mean actual valuation in the experiment depends on the treatment and the measurement used, but ranges between 15.9% (SI treatment, M1b measure) and 22.4% (C treatment, M1 and equivalent measures) of experimental winnings.

Between-treatment differences in mean psychological values are comparatively small. They are not statistically significant for any stage in Kruskal-Wallis χ^2 tests. In Mann-Whitney tests the closest we get to significance is for the SI treatment value being lower than that for the other treatments in stage 3,[22] but this result disappears in stage 4.

RESULT 4: Almost all subjects attributed a positive non-material/psychological value to own group membership. This remained high even with experienced subjects,

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[19] The correlation is larger when definite stayer observations are removed (ρ(M1b, stage) = - 0.346, P < 0.05; ρ(M2b, stage) = - 0.332, P < 0.05, (ρ(M3b, stage) = - 0.307, P < 0.06), but this is likely to be an artifact of the fact that later stages have a larger number of definite switches (they are 5% in stage 2, 7% in stage 3 and 11% in stage 4), and so of high psychological values being removed, hence exacerbating the downward bias problem in measured mean psychological values.

[20] The latter are likely to over-emphasize the decrease in psychological value (see previous footnote).

[21] Specifically, the lowest cost of 13.024 is for stage 4, SI treatment, M1b measurement: the corresponding percentage (projected over all three stages) can be found as (13.024 × 3 × 0.04) / 12.185 (mean gains in SI treatment) = 12.8%. The lowest total M1 cost of 18.054 is for stage 4 and the SG treatment: it can be found as (18.054 × 3 × 0.04)/ 12.169 (mean gains in SG treatment) = 17.8%.

[22] P values range from 0.043 to 0.125, with only one P value below 0.05 and the M1's P value equal to 0.072.

it decreased slightly but this trend was not statistically significant. The positive psychological valuation was fairly robust across treatments and was (at least, given possible downward biases in our measures) between 15.9% and 22.4% of experimental winnings.

Our next result comes from examining whether these revealed psychological benefits are related to the earlier significant result of negative discrimination and this takes us back to the interpretation of the psychological value terms in the random effects regressions in Table 4. It is conceivable that psychological benefits and negative discrimination may be entirely uncorrelated by-products of group inducement. However, we hypothesize that, as proxies for the value attached to group identity, psychological value measures may be predictors of the extent that subjects engage in negative discrimination. By multiplying psychological value measures by the relevant treatment dummy (C, SG or SI, equal to 1 in the respective treatments, else to 0) we can estimate their explanatory power on discrimination in each treatment. In Table 4, regressions 5 and 7 use M1 as measure of psychological value (Psychological Value in the table), while regressions 6 and 8 use M1b (Psychological Value b in the table). We find that the psychological value measures have no predictive power in the C treatment; they have predictive power on discrimination in mean giving rates ($P \leq 0.001$) and, more equivocally, on that in mean return rates (in one-tailed tests, $P < 0.1$ for M1 and $P < 0.05$ for M1b) in the SG treatment; they also have some possible predictive power in relation to the SI treatment, especially for mean giving rates (in one-tailed tests, $P < 0.06$ for M1 and $P < 0.02$ for M1b).

These results are not entirely surprising: the C treatment is the weakest of our group manipulations and it is interesting that this shows at least in this dimension in

our results; the SG treatment has a stronger group manipulation, and, while that in the SI treatment is strongest, discrimination may be driven more by the material incentives, to the detriment of psychological values. M1 and M1b are the best-performing psychological value measures in the discrimination regressions, but we also ran regressions with alternative measures of psychological value and we found that all of them still retain predictive power on discrimination in mean giving rates in the SG treatment, and have the expected positive sign on the relevant coefficients.[23]

RESULT 5: Controlling for a number of variables and for session level random effects, the psychological value measures predict discrimination in mean giving rates in the SG treatment; M1 and M1b measures also have some predictive power in relation to discrimination in mean return rates in the SG treatment and in giving rates in the SI treatment.

Last, we analyze a possible effect of high psychological values associated to group membership: namely, social inertia. Since our market mechanism ensured that each groups always stayed with the same number of subjects, in our experiment social inertia could manifest itself in less trades, and hence less group switches, than what would be predicted if subjects did not group-identify. Assume that the expected material gain from switching groups is x (which can be positive, zero or negative) and that subjects' evaluations has some small unsystematic random noise around x; assume furthermore that there is no positive psychological value. Then the standard prediction would follow, as normally made in WTP-WTA market experiments, that

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[23] Corresponding P values are 0.001 (M2), 0.004 (M2b), 0.017 (M3) and 0.069 (M3b).

we should observe 50% of all possible trades being implemented on average (e.g., Kahneman et al., 1990).[24]

(Insert Table 6 about here.)

Table 6 shows that trade was between 6.7% and 16.7% depending on the treatment which is much less than standard prediction. In short, there was significant social inertia. There was not a single session, or a single stage, where mean trade was as much as 50% of possible trade (Wilcoxon P < 0.005). Stage mean values hover between 0 and 20.8%, and differences among treatments are not statistically significant (except possibly in stage 2, where Kruskal-Wallis χ^2 = 5.635, P = 0.06). This is true even though the higher percentages in stages 2 and 4 of the SI treatment implied a proportionally greater fraction of markets having at least one group change and so a well-defined market price. Just one successful deal was required in order for group changes to occur and for a market price to emerge, and so the fact that in most markets (including slightly over 50% of SI markets) there was no group change and no market price emerged is itself indicative of social inertia in our experiment.

Mean market prices by session are not quite statistically different from one another across treatment (Kruskal-Wallis χ^2 = 3.8, P = 0.150). Nevertheless, while SG and SI mean prices are close to one another, both of them are about three times as large as the C mean price, and in a Mann-Whitney test the mean market price in the SI treatment is found higher than that in the C treatment (P = 0.05). Given the small number of trades for each treatment, not much should be read into these differences in mean market prices.

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[24] The fact that 9-10% of the subjects made definite stay choices, implying (in the absence of positive psychological values) $x > 48$, may be a problem for this prediction if, in fact, we observed an equivalent choice of $x = - 48$ by another rough 9-10% of the subjects. This would imply that in practice the [- 48… 48] valuation bounds may have prevented trade that would have otherwise occurred. However, there were only 2 valuation choices below – 40 in the whole experiment, and so this cannot be a plausible reason for observing less than 50% trade.

RESULT 6: There is a form of social inertia associated with group membership: people traded group membership less than would be expected in the absence of psychological benefits. This was true across all treatments, although, with the minimal groups of the C treatment, mean market prices were about one third of that in the other treatments (this may be an artifact of the small number of trades involved).

4. Discussion of results

Should policy makers take account of how any policy affects individuals' membership of groups? The literatures on social capital and identity would seem to encourage an affirmative answer, at least in principle. In practice, matters are rather more difficult because we neither know (a) whether such group effects are significant or (b) how any such group effect is decomposed between the influence of groups *per se* and the contribution that comes from the specific character of the actual groups in question. Our experiment is potentially important because it addresses both these areas of ignorance.

With respect to the first issue we focus on welfare effects of artificial groups and, in doing this, we also create the basis from which one can begin to answer the second. The point is that when studying natural groups we will only be able to discern the specific influence of an actual group if we know something about how the existence of groups *per se* affects behavior. In this way, our experiment acts as baseline control for those future studies of natural groups.

The precise contribution of our study to the first of these questions turns on our specific findings. There are four important ones. They apply to all the group treatments as there were few interesting differences between the various types of

groups that we induced experimentally. This lack of difference is perhaps surprising given, for example, the role that segregation can play in promoting within group cooperation in evolutionary game theory (see Bergstrom, 2002).[25]

4.1 The 'pure' group effect on trust is negative

This result runs counter to the conventional wisdom in the literature where groups are frequently cast as a form of social capital. Insofar as the contrary supposition in the literature is based on the experience with natural groups, this results suggests that the impact on welfare of actual groups may depend rather more on the character of the constitutive norms of those actual groups than the fact that they are groups *per se*.

4.2 'Pure' groups induce negative discrimination against outsiders

The existence of negative discrimination is, of course, the key to the negative social capital influence discussed above.[26] It is also noteworthy because, although this possibility is recognized in the literature (see Durlauf, 1999) and there is some support from another study of artificial groups (see Zizzo, 2003) and from some traditional social psychological experiments (see Sherif, 1966), some evidence from natural groups seems to point in a different direction. Fershtman and Gneezy's (2001) trust game experiment on natural groups found no ingroup bias effect but, in comparison to the results from other experiments they performed, some gender-specific evidence of generalized adverse beliefs of the trustworthiness of the low-status group.[27] Their

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[25] Although it provides some evidence that anonymity did have the effect of making each interaction a one-shot game for subjects (see footnotes 7 and 10).

[26] It is also inconsistent with the conjecture that group effects are driven by an expectation of more frequent repeated play with insiders relative to play with generic coplayers in the B treatment, since this should lead to positive rather than negative discrimination (see footnote 7),

[27] Only men discriminated, and did so in relation to men only.

experiments, unlike ours, were one-shot and had a classroom and non-anonymity flavor that may have worked against negative outgroup discrimination, but may be consistent with psychological evidence that, with natural groups of different status, the subordinate group may form beliefs consistent with dominant group favoritism (see Tajfel and Turner, 2001, for a discussion). There is also the claim in the Goette et al. (2006) prisoners' dilemma experiment with weak natural groups that there is no evidence of negative discrimination against outsiders, although this is only indirectly inferred rather than directly tested in the manner of our experiment. Taking these papers at their face value, our specific result of negative discrimination in artificial groups tends to reinforce the earlier conclusion with respect to the potential importance of norms and beliefs of natural groups in influencing behavior.

The result is also worth drawing out because this type of negative discrimination might plausibly have broader adverse influences on society which would have to be taken into account in any putative cost-benefit calculation regarding groups. The point here, while speculative, is that societies with a distinct number of groups can exhibit at least two polar kinds of inter-group dynamics. On the one hand there is the celebration of difference and variety which animates visions of multiculturalism. On the other, there is the kind of Balkanized society where such differences can quite literally become battlegrounds. The worry in this context is that negative discrimination seems more likely, *ceteris paribus*, to be associated with the dynamic that leads to the development of a Balkanized rather than a multicultural society. This is because on some accounts of belief formation (e.g. those associated with cognitive dissonance theory, see Festinger, 1957) behavior of this kind is likely

to seed a more encompassing set of adverse beliefs about the other group as a way of rationalizing this discriminatory behavior.[28]

4.3 A positive psychological 'pure' group effect on welfare

We have found that people on average place a value on their own group membership which exceeds the material advantages of belonging to that group. If we assume that preferences are revealed in behavior, then we can infer that there are genuine additional psychological benefits that people enjoy from belonging to their groups and this evidence is consistent with arguments like those of Adam Smith and Akerlof and Kranton (2000) around the role of groups. While it is usual to assume that behavior reveals a genuine preference in this sense, there is a reason in this instance to pause because there is an alternative interpretation of these valuations.

By construction, our measure of this psychological value is revealed in the gap between people's WTP to join a group and their WTA compensation to leave a group and it is well know from the experimental literature on, for example, the valuation of environmental goods that there is often a wedge between such WTP and WTA assessment (see Bateman and Willis, 1999). This wedge is a puzzle in those settings because there is rarely an interpretation which is analogous to the one we have advanced here so far around the influence that group membership has, say, on one's sense of identity. Instead, it is often assimilated to the well known class of effects that can arise when people have reference dependent preferences (perhaps due to forms of inexperience with the questions being asked: see Loomes et al., 2003) and this creates the possibility that it should be discounted from a welfare perspective. In other words, it is still a psychological phenomenon, but it is a consequence of the

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[28] For a recent account of the relationship between stereotypical beliefs and behavior, see Abrams and Hogg (2001).

particular psychological way that individuals think about decision problems and should not necessarily be taken into account when judging the welfare effects of a change.

There are, however, some reasons for preferring the interpretation of the WTP-WTA wedge as betokening genuine psychological benefits (or at least for acknowledging the role of this interpretation, see also Brown, 2005). For example there is the neurobiological evidence on how group membership is correlated with endorphin levels, referred to earlier (see Dunbar, 2006). In addition in the other studies where the WTP-WTA wedge occurs, it often declines with experience and this is taken as evidence that it should not count in welfare calculations (see Loomes et al., 2003, for a discussion and experimental test of whether the gap fully disappears). There is, however, no statistically significant trend downwards in our study in the size of the WTP-WTA wedge as subjects gain experience with the decision problem. Furthermore, the apparent association at an individual level between the degree of negative discrimination and the perception of psychological value when the group manipulations were stronger (Result 5) would be understandable if the perception of psychological value mapped on to a genuine feeling of benefit. For instance, one might quite plausibly value staying in a group rather than joining the other when one has discriminated against it. The discomfort of joining people one has been nasty to, so to speak, is one possible connection here. Alternatively, it might work the other way, the strength of feeling about being a member of this group might rationalize the discrimination against the other group. In either case, the psychological value attached to being a member of one's group is real.

There is a further possible interpretation of the WTP-WTA wedge. It could reflect a general aversion to change which attaches in this instance to moving from a

group. This is something akin to a halfway house between the two interpretations discussed so far. The benefit attached to being a member of one's group would still be real in the sense that this was how an individual avoided the disagreeableness of change. However, one might plausibly suspect that once a change had incurred, the experience of a psychological cost from leaving one's original group would recede with time and one would come to attach a similar benefit to staying with one's 'new' group as this would become the way in which one avoided change in the future.

4.4 A negligible net benefit of 'pure' groups?

Under what would be the usual revealed preference interpretation that the excess valuation of group membership betokens a genuine psychological benefit, our experiment reveals two conflicting effects of groups on individual welfare that have been quantified. It is natural to ask which predominates in our case and the answer is given in Table 7.

(Insert Table 7 about here.)

There is a small net benefit in each of the group treatments but it is not statistically significantly different from zero. Thus, it would appear that the existence of pure groups has a negligible impact on welfare. There are two important qualifications to this conclusion which are worth mentioning.

The first turns on the interpretation of the WTP-WTA wedge discussed above. It will be plain that, to the extent that either of the alternative interpretations is compelling, the value placed in the psychological column as a genuine benefit will decline and this will tip the calculation in the negative direction.[29]

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[29] Against this, it might be argued that the psychological value revealed here for own group membership is a net figure that comes from comparing the psychological benefits associated with each group. In this way it understates the total value of the psychological benefits that arise from the existence of groups. We are not especially persuaded by this argument, however, because, in so far as

Second, even if the valuation of group membership does reflect a genuine psychological benefit, this could, in other circumstances, be the source of material welfare losses. In our experiment, there is no aggregate material gain from the actual swapping of people between groups because the number of people in each group is held constant. In many contexts however the numbers in a group are not fixed. If there were no psychological benefits in such cases and there were differences in the material benefits from belonging to each group, people would switch to the one with highest material rewards and there would be an increase in aggregate material benefits. The presence of psychological benefits could, if sufficiently large, though, cause a kind of social inertia by providing a counter to the material benefit that would come from switching. To the extent that this happens there would be additional material losses which would push the net benefit test in the negative direction.

5 Conclusion

The literatures on social capital and on the ways that belonging to groups can produce psychological benefits for individuals have tended to emphasize the positive contribution that groups can make to society. There is, though, a darker side to the existence of groups. The ethnic conflicts in the Balkans, the 'troubles' in Northern Ireland, the genocide in Rwanda and the sectarian strife in Iraq are all recent reminders of the way that existence of groups can also mark the fault lines in a society where real battles take place. It would seem therefore that groups *per se* are not unambiguously welfare enhancing, and could be the source of potentially perverse social capital. In these circumstances, it would be as well for public policy makers to

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the psychological benefits are associated with the identity effects of belonging to a group, they cannot be coherently entertained in connection with the membership of another group since this would actually involve a change in identity.

know more about how groups come to have one effect rather than another. This paper is a contribution towards that end.

Our experiment on artificial groups gives some insights into the ways that the simple presence of groups can be both positive and negative. We found that trust fell when there were groups as a result of negative discrimination against outsiders. Against this there is evidence in our experiment that the membership of groups *per se* is the source of a psychological benefit (which roughly exactly offset the negative welfare effect that groups had on the level of trust). The 'pure' effects of groups would thus seem to be neutral in terms of welfare. The interpretation of the valuation of group membership in the experiment as signifying a positive psychological benefit is, however, controversial and so perhaps the more appropriate conclusion is that the 'pure' effects of groups on welfare are at best neutral and they could be negative.

This suggests that the fact that actual, natural groups in a society seem sometimes to be associated with significant good outcomes owes much to the distinguishing norms of those groups rather than to the fact that they are groups. The study of the role of those norms in natural groups thus becomes more pressing from a public policy perspective. Towards this end, our paper is also potentially important because it supplies a baseline insight into the effects of groups *per se* from which the study of natural groups can then extract the particular influence of that group's norms.

Appendix – Relationship between means of psychological value measures

PROPOSITION: assume that: (a) expectations are homogenous across subjects within each stage; (b) all observations are included. Then, for any expectation about material

gains, the mean psychological value by stage or by session is the same and is equal to the mean M1 (WTA or – WTP) by stage or by session.

PROOF: let y_i be the M1 valuation by each subject i and let there be n subjects in a session. Then the mean M1 in each stage is equal to $\sum y_i / n$. Let x be the common expectation about material gains from belonging to group k. Then ½ of the subjects have an expected own group material value of $+ x$ and the other half of $– x$. In each stage, half of the subjects (those belonging to k) will have an own group value of $+ x$ and half of the subjects (those not belonging to k) of $– x$. Then, given that all observations are included, the expectation-dependent mean psychological value is equal to:

$$\frac{\sum y_i - (n/2)x + (n/2)x}{n} = \frac{\sum y_i}{n}$$

which is to say that the mean psychological value is not a function of the expectation value x, and is the same as mean M1. Since the mean psychological value by session is the average of the mean psychological values in each of stage 2, 3 and 4, the same identities apply at the level of mean psychological values by session.

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Figure 1 – Sample computer display

Stage 4 out of 4	Round 2 out of 6	Remaining time [sec]: 33

You belong to the **Blue** group.
The **Second Mover** belongs to the **Blue** group.

Giving rates (%) in each round.

Stage	Round	Blue to Blue	Blue to Red	Red to Red	Red to Blue
2	1	47.9		47.9	
2	2		27.1		31.2
2	3		20.8		31.2
2	4		20.8		18.7
2	5	62.5		52.1	
2	6	60.4		79.2	
3	1		22.9		27.1
3	2	75.0		54.2	
3	3	83.3		50.0	
3	4		27.1		22.9
3	5		29.2		43.7
3	6	87.5		70.8	
4	1		27.1		29.2

You are the **First Mover** and receive 48 points.

How many points do you wish to give to the **Second Mover** for this round?

30

Return rates (%) in each round.

Stage	Round	Blue to Blue	Blue to Red	Red to Red	Red to Blue
2	1	23.2		17.4	
2	2		26.7		28.2
2	3		22.2		40.0
2	4		7.4		40.0
2	5	44.4		40.0	
2	6	35.6		43.9	
3	1		33.3		36.4
3	2	46.3		30.8	
3	3	41.7		41.7	
3	4		30.3		25.6
3	5		19.0		31.0
3	6	44.4		48.0	
4	1		23.8		5.1

OK

Notes: The sample computer display is from the C treatment. After each round a new line was added to the giving rate and the return rate tables. In each stage 2-4 round subjects were either all matched with insiders or all matched with outsiders.

Figure 2 – Giving and return rates in Stages 2-4
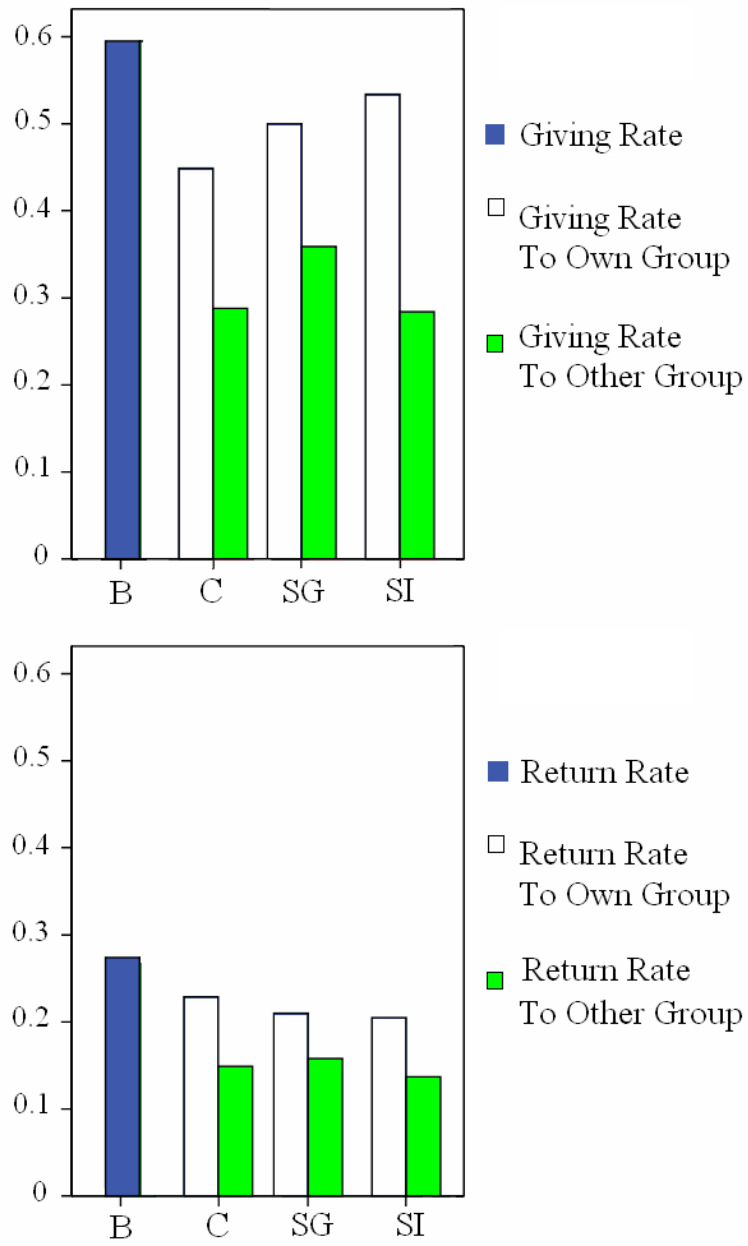
Figure 3 – Histograms of psychological values by subject
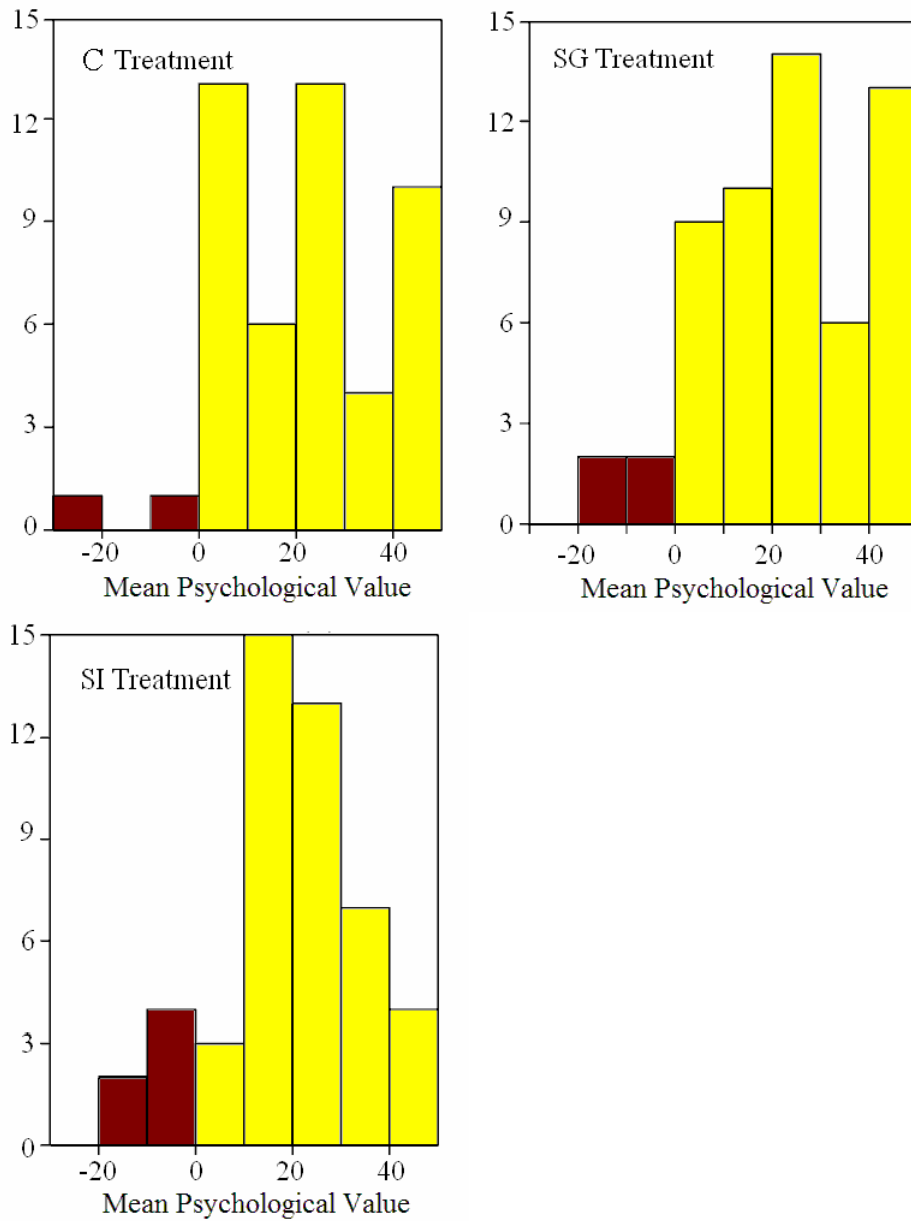
Notes: The histograms depict the distribution of M1 mean psychological values associated to each subject (n = 48, 56 and 48 for the C, SG and SI treatments, respectively). Histograms using other measures are similar.

Table 1 – Experimental sequence

Experimental Sequence	Task	Number of rounds
Stage 1	Trust games	3
Stage 2	Market 1 or Waiting Period 1	
	Trust games	6
Stage 3	Market 2 or Waiting Period 2	
	Trust games	6
Stage 4	Market 3 or Waiting Period 3	
	Trust games	6

Note: at the start of each of stages 2, 3 and 4 the experiment had a waiting period in the B treatment, and markets for groups in the C, SG and SI treatments (technically, there were two markets, one to pay for membership of each of the two groups).

Table 2 – Giving and return rates

	B	C	SG	SI
Stage 1 Giving Rate	0.517	0.492	0.516	0.498
Stages 2-4 Giving Rate	0.595	0.369	0.453	0.498
to Insiders		0.449	0.5	0.534
to Outsiders		0.288	0.359	0.284
Stage 1 Return Rate	0.302	0.202	0.267	0.296
Stages 2-4 Return Rate	0.274	0.186	0.193	0.194
to Insiders		0.229	0.21	0.205
to Outsiders		0.149	0.158	0.137

Table 3 – Random effects regressions on mean giving and return rate

Regressions on Stage 2-4 Mean Giving Rate By Individual Subject

	Regression 1			Regression 2		
	β	t	P	β	t	P
Stage 1 Giving Rate	0.408	7.11	0	0.408	7.09	0
Stage 1 Return Rate	0.082	1.07	0.286	0.092	1.2	0.231
Not B				-0.166	-2.79	0.005
C	-0.227	-2.91	0.004			
SG	-0.126	-1.7	0.09			
SI	-0.158	-2.04	0.041			
Gender	-0.061	-1.93	0.054	-0.062	-1.94	0.052
Christian	0.04	0.87	0.385	0.043	0.95	0.342
AgnosticAtheist	0.09	2.1	0.036	0.089	2.06	0.039
Age	0.003	1.12	0.262	0.003	0.92	0.355
Constant	0.273	2.73	0.006	0.283	2.92	0.004
R^2	0.372			0.352		

Regressions on Stage 2-4 Mean Return Rate By Individual Subject

	Regression 3			Regression 4		
	β	t	P	β	t	P
Stage 1 Giving Rate	0.103	3.17	0.002	0.104	3.22	0.001
Stage 1 Return Rate	0.149	3.37	0.001	0.139	3.19	0.001
Giving Rate As Second Mover	0.196	3.24	0.001	0.181	3.09	0.002
Not B				-0.045	-1.85	0.064
C	-0.027	-0.87	0.385			
SG	-0.038	-1.41	0.158			
SI	-0.063	-2.23	0.026			
Gender	-0.039	-2.15	0.032	-0.037	-2.03	0.043
Christian	0.028	1.08	0.281	0.031	1.19	0.235
AgnosticAtheist	0.004	0.16	0.873	0.004	0.16	0.874
Age	0.005	2.74	0.006	0.005	3	0.003
Constant	-0.042	-0.66	0.507	-0.04	-0.64	0.523
R^2	0.311			0.303		

Notes: sample size: $n = 184$. The sample is not of 188 observations since Stage 1 Return Rate is not defined for four subjects (who were offered zero in Stage 1). Regressions control for session level random effects. P values provided are two tailed.

Table 4 – Random effects regressions on difference in mean giving and return rate to insiders and outsiders

Regressions on Stage 2-4 Difference in Average Giving Rate to Insiders and Outsiders by Subject						
	Regression 5			Regression 6		
	β	t	P	β	t	P
SG	-0.141	-1.42	0.156	-0.11	-0.97	0.332
SI	0.04	0.39	0.698	0.01	0.09	0.931
Psychological Value x C	0.002	0.84	0.402			
Psychological Value x SG	0.008	3.69	0			
Psychological Value x SI	0.004	1.61	0.107			
Psychological Value b x C				0.001	0.58	0.56
Psychological Value b x SG				0.006	3.2	0.001
Psychological Value b x SI				0.006	2.27	0.023
Gender	-0.083	-2	0.046	-0.087	-2.06	0.039
Christian	-0.02	-0.33	0.744	-0.031	-0.48	0.631
AgnosticAtheist	0.056	0.97	0.334	0.043	0.73	0.467
Age	-0.007	-1.82	0.068	-0.006	-1.67	0.094
Constant	0.303	2.32	0.02	0.314	2.27	0.023
R^2	0.163			0.15		
Regressions on Stage 2-4 Difference in Average Return Rate to Insiders and Outsiders by Subject						
	Regression 7			Regression 8		
	β	t	P	β	t	P
Diff. in Trust Rate as Second Mover	0.253	4.95	0	0.246	4.79	0
SG	-0.08	-1.26	0.207	-0.067	-1.06	0.291
SI	-0.078	-1.19	0.235	-0.063	-0.95	0.344
Psychological Value x C	-0.001	-0.5	0.618			
Psychological Value x SG	0.002	1.35	0.177			
Psychological Value x SI	0.002	1.19	0.232			
Psychological Value b x C				0	0.01	0.991
Psychological Value b x SG				0.002	1.68	0.092
Psychological Value b x SI				0.002	1.32	0.187
Gender	-0.033	-1.23	0.218	-0.037	-1.36	0.175
Christian	-0.005	-0.11	0.911	-0.007	-0.17	0.862
AgnosticAtheist	0.006	0.16	0.875	0.006	0.16	0.875
Age	0.001	0.2	0.838	0	0.19	0.85
Constant	0.081	0.94	0.348	0.07	0.8	0.423
R^2	0.229			0.236		

Notes: sample size: *n* = 152 (regressions 5 and 7) and 151 (regressions 6 and 8). An observation is omitted from regressions 6 and 8 since Psychological Value b is not defined for one subject. Regressions control for session level random effects. The dependent variable is DAvgGivingRate = mean giving rate to insiders *minus* mean giving rate to outsiders for regressions 5 and 7. It is DAvgReturnRate = mean return rate to insiders *minus* mean return rate to outsiders for regressions 6 and 8. Diff. in Trust Rate as Second Mover stands for mean giving rate gifted as second mover from insiders *minus* mean trust rate gifted as second mover from outsiders. Psychological Value stands for the M1 measure (or M2, or M3, or anyone else satisfying the conditions of Appendix B: see section 3.2.1); Psychological Value b is measured by the M1b value (see section 3.2.1). P values provided are two tailed.

Table 5 – Mean psychological values

Treatment	Stage	M1, M2, M3	M1b	M2b	M3b
C	2	21.042	19.826	19.826	19.571
	3	24.646	23.022	23.121	22.937
	4	21.063	17.814	17.654	17.766
	Total	22.25	20.254	20.235	20.122
SG	2	23.393	22.444	22.444	22.147
	3	26.054	23.804	24.435	24.488
	4	18.054	15.02	15.985	15.727
	Total	22.5	20.462	20.983	20.813
SI	2	19.958	18.022	18.022	17.556
	3	18.813	17.5	17.697	17.792
	4	18.271	13.024	13.799	14.838
	Total	19.014	16.288	16.597	16.794

Notes: M1, M2, M3, M1b, M2b, M3b are different measures of psychological value, as described in the main text. The (M1, M2, M3) column values also apply to any other psychological value measure which assigns a constant value (such as 49) to definite stayer cases and which is based on homogenous expectations (see Appendix B).

Table 6 – Group changes and market prices

Treatment	Stage	Number of Group Changes As a Fraction of All Possible Deals	Number of Markets with Group Changes	Average Market Price When Deal Is Done
C	2	0.083	2	6
	3	0.125	3	9.333
	4	0.083	2	1
	Total	0.097	7 (out of 24)	6
SG	2	0	0	
	3	0.067	2	15.5
	4	0.133	2	18.5
	Total	0.067	4 (out of 30)	17
SI	2	0.208	5	16.2
	3	0.083	2	25.5
	4	0.208	4	20.5
	Total	0.167	11 (out of 24)	19.455

Notes: in each market stage there are two markets (one for paying for the membership of each group), and so there are six markets per session. The market price is defined over the markets in relation to which group changes deals are made.

Table 7 – Net welfare effects of groups

Treatment	Material Gain	Net Social Value (M1, M2, M3)	Net Social Value (M1b)	Net Social Value (M2b)	Net Social Value (M3b)
C	-21.523	0.727	-1.269	-1.288	-1.401
SG	-12.549	9.951	7.913	8.434	8.264
SI	-13.906	5.108	2.382	2.691	2.888

Notes: In relation to each treatment, net social value is computed by subtracting mean psychological values, as reported in Table 5 according to a number of measures (M1, M2, M3, M1b, M2b, M3b), from the mean Material Gain estimate. Values are expressed as experimental points, each of which was worth 0.04 UK pounds.

Electronic Appendix - The Value of Groups.

This appendix will not be part of the published paper but will be available electronically.

Experimental Instructions

The instructions provided below are for sessions with 12 subjects. For the one SG session with 8 subjects, the obvious adjustments were made.

B Treatment

1. Introduction

This is an experiment on decision making. Please raise your hand if you have any questions at any point in the experiment.

The experiment is divided into **four stages**. Stage 1 consists of three rounds. Stages 2 through 4 consist of six rounds each. There will be a two minutes **waiting period** between stages.

There are twelve participants in the experiment, all of which have received the same set of instructions as you have. You will be matched in each round at random with one other participant (the **coparticipant**). As a result, the coparticipant is very likely to change from round to round.

2. Round Decisions

Give/Return Decisions: Each round one of you will be designated to move first. The **First Mover** will begin by receiving either 24 points (in Stage 1) or 48 points (in Stages 2 through 4). He or she will decide how many points (if any) to give to the other person and how many (if any) to keep.

All the points given get multiplied by **3** before they are received by the **Second Mover**. The Second Mover then decides how much (if any) to keep and how much (if any) to return to the First Mover.

Role: in Stage 1 you will have each of the two roles – that of First Mover and that of Second Mover – at least once. In Stages 2, 3 and 4 you will be First Mover for three rounds out of six and Second Mover for the remaining three.

Information: Each round you will learn about your coparticipant's decision and about your round earnings. No information will be provided about the coparticipant's identity. In Stages 2, 3 and 4, the computer screen will also display the following information:
*   **Giving rate**: this tells you what is the average percentage of the 48 points that First Movers in the experiment have given Second Movers from the start of Stage 2 onwards.

- **Return rate**: this tells you what is the average percentage of the amount received that Second Movers have returned to First Movers from the start of Stage 2 onwards.

A summary table on outcomes from Stage 2 onwards will also be provided at the end of Stages 2, 3 and 4.

Timing: We ask you to make your give/return decisions in less than <u>one minute and thirty seconds</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

3. Payments

Round payments. The decisions that you and your coparticipants make will determine the amounts you gain as round payments. Specifically, at the end of the experiment a **winning round** is chosen at random from each stage and your earnings in each winning round are converted into pounds at the rate of 4 pence per experimental point.

Waiting period payments. In addition, you are paid 48 points at the start of each of the waiting periods. Again, at the end of the experiment points will be converted into pounds at the rate of 4 pence per experimental point.

Your final earnings will be equal to the sum of round payments and of waiting period payments. Please remain seated until we come to your desk to give you the money.

Before starting to take decisions, we ask you to fill the enclosed questionnaire, with the only purpose of checking whether you have understood these instructions. Raise your hand when you have completed the questionnaire.

<u>C Treatment</u>

Experimental Instructions

1. Introduction

This is an experiment on decision making. Please raise your hand if you have any questions at any point in the experiment.

The experiment is divided into **four stages**. Stage 1 consists of three rounds. Stages 2 through 4 consist of an initial market task followed by six rounds.

There are twelve participants in the experiment, all of which have received the same set of instructions as you have.

At the start of the experiment you are randomly assigned to **either the Blue group or the Red group**. Overall, six participants are assigned to each group.

In Stage 1, you will be matched in each round at random with one other participant (the **coparticipant**). From Stage 2 onwards, you will be randomly matched with coparticipants **within your group** for **three** rounds out of six, and with coparticipants

from the other group for the remaining **three** rounds. As a result of these matching rules, the coparticipant is very likely to change from round to round.

2. Round Decisions

Give/Return Decisions: Each round one of you will be designated to move first. The **First Mover** will begin by receiving either 24 points (in Stage 1) or 48 points (in Stages 2 through 4). He or she will decide how many points (if any) to give to the other person and how many (if any) to keep.

All the points given get multiplied by **3** before they are received by the **Second Mover**. The Second Mover then decides how much (if any) to keep and how much (if any) to return to the First Mover.

Role: in Stage 1 you will have each of the two roles – that of First Mover and that of Second Mover – at least once. In Stages 2, 3 and 4 you will have each of the two roles – that of First Mover and that of Second Mover – at least once when matched with a coparticipant within your group and at least once when matched with a coparticipant from the other group. More specifically, if in a given stage you are First Mover once when matched with a coparticipant within your group, you are also First Mover once when matched with a coparticipant from the other group. Alternatively, if you are First Mover twice when matched with a coparticipant within your group, you are also First Mover twice when matched with a coparticipant from the other group.

Information: Each round you will learn about your coparticipant's decision and about your round earnings. In Stages 2, 3 and 4, the computer screen will also display the following information:
- **Group membership**: you will be told what the coparticipant's group is. No other information will be provided about her or his identity.
- **Giving rates**: a table will be provided with information on giving rates, i.e. on the average percentages of the 48 points that First Movers have given Second Movers from the start of Stage 2 onwards. Specifically, you will be told giving rates:
  - By Blue First Movers when dealing with Blue Second Movers;
  - By Blue First Movers when dealing with Red Second Movers;
  - By Red First Movers when dealing with Blue Second Movers;
  - By Red First Movers when dealing with Red Second Movers.
- **Return rates**: a table will be provided with information on return rates, i.e. on the average percentage of the amount received that Second Movers have returned to First Movers from the start of Stage 2 onwards. Specifically, you will be told return rates:
  - By Blue Second Movers when dealing with Blue First Movers;
  - By Blue Second Movers when dealing with Red First Movers;
  - By Red Second Movers when dealing with Blue First Movers;
  - By Red Second Movers when dealing with Red First Movers.

A summary table on outcomes from Stage 2 onwards will also be provided at the end of Stages 2, 3 and 4.

Timing: We ask you to make your give/return decisions in less than <u>one minute and thirty seconds</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

3. Market Decisions

At the start of Stages 2, 3 and 4 you receive 48 points and a market opens up giving you an opportunity to change group if you wish.

You are first asked to state whether, if you could choose which group to be in, and both options were free of charge, you would rather stay in your group or switch groups.

If you state that you would rather stay in your group, you are then asked to state how much you would need to **be paid** by a member of the other group in order to be willing to swap places with him or her. You can state any value between 0 and 48 points, or you may state that you would rather stay in your group whatever the price (between 0 and 48 points). If you state a value, you are a potential **seller** for the membership of your group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of your group. If your value is <u>lower</u> than or <u>equal</u> to the market price, you <u>are paid</u> the market price and switch groups: you swap places with the buyer of your group membership.

If you state that you would rather switch groups, you are then asked to state how much you are willing to **pay** to a member of the other group so that he or she swaps places with you. You can state any value between 0 and 48 points, and you are then a potential **buyer** for the membership of the other group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of the other group. If your value is <u>higher</u> than or <u>equal</u> to the market price, you <u>pay</u> the market price and switch groups: you swap places with the buyer of your group membership.

If, as the result of everyone's decisions, there are changes in group membership, it will still be the case that each group will be made by six participants each, since the only way of switching group is by swapping place with a member of the other group.

Timing: We ask you to make your market decisions in less than <u>four minutes</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

4. Payments

Round payments. The decisions that you and your coparticipants make will determine the amounts you gain as round payments. Specifically, at the end of the experiment a **winning round** is chosen at random from each stage and your earnings in each winning round are converted into pounds at the rate of 4 pence per experimental point.

Market payments. In addition, you are paid the 48 points you were given at the start of Stage 2, 3 and 4, plus any price that you have been paid in market tasks, minus any

price that you have paid in market tasks. Again, at the end of the experiment points will be converted into pounds at the rate of 4 pence per experimental point.

Your final earnings will be equal to the sum of round payments and of market payments. Please remain seated until we come to your desk to give you the money.

Before starting to take decisions, we ask you to fill the enclosed questionnaire, with the only purpose of checking whether you have understood these instructions. Raise your hand when you have completed the questionnaire.

<u>SG Treatment</u>

Experimental Instructions

1. Introduction

This is an experiment on decision making. Please raise your hand if you have any questions at any point in the experiment.

The experiment is divided into **four stages**. Stage 1 consists of three rounds. Stages 2 through 4 consist of an initial market task followed by six rounds.

There are twelve participants in the experiment, all of which have received the same set of instructions as you have.

At the start of the experiment you are randomly assigned to **either the Blue group or the Red group**. Overall, six participants are assigned to each group.

In Stage 1, you will be matched in each round at random with one other participant (the **coparticipant**). From Stage 2 onwards, you will be randomly matched with coparticipants **within your group** for **four** rounds out of six, and with coparticipants **from the other group** for the remaining **two** rounds. As a result of these matching rules, the coparticipant is very likely to change from round to round.

2. Round Decisions

Give/Return Decisions: Each round one of you will be designated to move first. The **First Mover** will begin by receiving either 24 points (in Stage 1) or 48 points (in Stages 2 through 4). He or she will decide how many points (if any) to give to the other person and how many (if any) to keep.

All the points given get multiplied by **3** before they are received by the **Second Mover**. The Second Mover then decides how much (if any) to keep and how much (if any) to return to the First Mover.

Role: in Stage 1 you will have each of the two roles – that of First Mover and that of Second Mover – at least once. In Stages 2, 3 and 4 you will be First Mover for three rounds out of six and Second Mover for the remaining three. More specifically, you will be First Mover twice when matched with a coparticipant within your group and once when matched with a coparticipant from the other group. Similarly, you will be

Second Mover twice when matched with a coparticipant within your group and once when matched with a coparticipant from the other group.

Information: Each round you will learn about your coparticipant's decision and about your round earnings. In Stages 2, 3 and 4, the computer screen will also display the following information:

- **Group membership**: you will be told what the coparticipant's group is. No other information will be provided about her or his identity.
- **Giving rates**: a table will be provided with information on giving rates, i.e. on the average percentages of the 48 points that First Movers have given Second Movers from the start of Stage 2 onwards. Specifically, you will be told giving rates:
    - By Blue First Movers when dealing with Blue Second Movers;
    - By Blue First Movers when dealing with Red Second Movers;
    - By Red First Movers when dealing with Blue Second Movers;
    - By Red First Movers when dealing with Red Second Movers.
- **Return rates**: a table will be provided with information on return rates, i.e. on the average percentage of the amount received that Second Movers have returned to First Movers from the start of Stage 2 onwards. Specifically, you will be told return rates:
    - By Blue Second Movers when dealing with Blue First Movers;
    - By Blue Second Movers when dealing with Red First Movers;
    - By Red Second Movers when dealing with Blue First Movers;
    - By Red Second Movers when dealing with Red First Movers.

A summary table on outcomes from Stage 2 onwards will also be provided at the end of Stages 2, 3 and 4.

Timing: We ask you to make your give/return decisions in less than <u>one minute and thirty seconds</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

3. Market Decisions

At the start of Stages 2, 3 and 4 you receive 48 points and a market opens up giving you an opportunity to change group if you wish.

You are first asked to state whether, if you could choose which group to be in, and both options were free of charge, you would rather stay in your group or switch groups.

If you state that you would rather stay in your group, you are then asked to state how much you would need to **be paid** by a member of the other group in order to be willing to swap places with him or her. You can state any value between 0 and 48 points, or you may state that you would rather stay in your group whatever the price (between 0 and 48 points). If you state a value, you are a potential **seller** for the membership of your group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of your group. If your value is <u>lower</u> than or <u>equal</u> to the market price, you <u>are paid</u> the market price and switch groups: you swap places with the buyer of your group membership.

If you state that you would rather switch groups, you are then asked to state how much you are willing to **pay** to a member of the other group so that he or she swaps places with you. You can state any value between 0 and 48 points, and you are then a potential **buyer** for the membership of the other group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of the other group. If your value is <u>higher</u> than or <u>equal</u> to the market price, you <u>pay</u> the market price and switch groups: you swap places with the buyer of your group membership.

If, as the result of everyone's decisions, there are changes in group membership, it will still be the case that each group will be made by six participants each, since the only way of switching group is by swapping place with a member of the other group.

Timing: We ask you to make your market decisions in less than <u>four minutes</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

4. Payments

Round payments. The decisions that you and your coparticipants make will determine the amounts you gain as round payments. Specifically, at the end of the experiment a **winning round** is chosen at random from each stage and your earnings in each winning round are converted into pounds at the rate of 4 pence per experimental point.

Market payments. In addition, you are paid the 48 points you were given at the start of Stage 2, 3 and 4, plus any price that you have been paid in market tasks, minus any price that you have paid in market tasks. Again, at the end of the experiment points will be converted into pounds at the rate of 4 pence per experimental point.

Your final earnings will be equal to the sum of round payments and of market payments. Please remain seated until we come to your desk to give you the money.

Before starting to take decisions, we ask you to fill the enclosed questionnaire, with the only purpose of checking whether you have understood these instructions. Raise your hand when you have completed the questionnaire.

<u>**SI Treatment**</u>

Experimental Instructions

1. Introduction

This is an experiment on decision making. Please raise your hand if you have any questions at any point in the experiment.

The experiment is divided into **four stages**. Stage 1 consists of three rounds. Stages 2 through 4 consist of an initial market task followed by six rounds.

There are twelve participants in the experiment, all of which have received the same set of instructions as you have.

At the start of the experiment you are randomly assigned to **either the Blue group or the Red group**. Overall, six participants are assigned to each group.

In Stage 1, you will be matched in each round at random with one other participant (the **coparticipant**). From Stage 2 onwards, you will be randomly matched with coparticipants **within your group** for **four** rounds out of six, and with coparticipants **from the other group** for the remaining **two** rounds. As a result of these matching rules, the coparticipant is very likely to change from round to round.

2. Round Decisions

Give/Return Decisions: Each round one of you will be designated to move first. The **First Mover** will begin by receiving either 24 points (in Stage 1) or 48 points (in Stages 2 through 4). He or she will decide how many points (if any) to give to the other person and how many (if any) to keep.

In Stage 1, all the points given get multiplied by **3** before they are received by the **Second Mover**.

In Stages 2, 3 and 4, all the points given get multiplied by **either 2 or 4** before they are received by the **Second Mover**. To determine whether the points given get doubled or quadrupled, in each round we compare the overall amounts given to Blue Second Movers with that given to Red Second Movers:
- If more has been given to Blue Second Movers, all points given to them get multiplied by 4, whereas all points given to Red Second Movers get multiplied by 2;
- If more has been given to Red Second Movers, all points given to them get multiplied by 4, whereas all points given to Blue Second Movers get multiplied by 2.
- If the same has been given to Blue and to Red Second Movers, the group that gets their received points multiplied by 4 rather than by 2 is chosen at random.

The Second Mover then decides how much (if any) to keep and how much (if any) to return to the First Mover.

Role: in Stage 1 you will have each of the two roles – that of First Mover and that of Second Mover – at least once. In Stages 2, 3 and 4 you will be First Mover for three rounds out of six and Second Mover for the remaining three. More specifically, you will be First Mover twice when matched with a coparticipant within your group and once when matched with a coparticipant from the other group. Similarly, you will be Second Mover twice when matched with a coparticipant within your group and once when matched with a coparticipant from the other group.

Information: Each round you will learn about your coparticipant's decision and about your round earnings. In Stages 2, 3 and 4, information will be provided on who gets their received amounts quadrupled: whether, in a given round, it is Blue Second Movers or Red Second Movers. In Stages 2, 3 and 4, the computer screen will also display the following information:

- **Group membership**: you will be told what the coparticipant's group is. No other information will be provided about her or his identity.
- **Giving rates**: a table will be provided with information on giving rates, i.e. on the average percentages of the 48 points that First Movers have given Second Movers from the start of Stage 2 onwards. Specifically, you will be told giving rates:
    - o By Blue First Movers when dealing with Blue Second Movers;
    - o By Blue First Movers when dealing with Red Second Movers;
    - o By Red First Movers when dealing with Blue Second Movers;
    - o By Red First Movers when dealing with Red Second Movers.
- **Return rates**: a table will be provided with information on return rates, i.e. on the average percentage of the amount received that Second Movers have returned to First Movers from the start of Stage 2 onwards. Specifically, you will be told return rates:
    - o By Blue Second Movers when dealing with Blue First Movers;
    - o By Blue Second Movers when dealing with Red First Movers;
    - o By Red Second Movers when dealing with Blue First Movers;
    - o By Red Second Movers when dealing with Red First Movers.

A summary table on outcomes from Stage 2 onwards will also be provided at the end of Stages 2, 3 and 4.

Timing: We ask you to make your give/return decisions in less than <u>one minute and thirty seconds</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

3. Market Decisions

At the start of Stages 2, 3 and 4 you receive 48 points and a market opens up giving you an opportunity to change group if you wish.

You are first asked to state whether, if you could choose which group to be in, and both options were free of charge, you would rather stay in your group or switch groups.

If you state that you would rather stay in your group, you are then asked to state how much you would need to **be paid** by a member of the other group in order to be willing to swap places with him or her. You can state any value between 0 and 48 points, or you may state that you would rather stay in your group whatever the price (between 0 and 48 points). If you state a value, you are a potential **seller** for the membership of your group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of your group. If your value is <u>lower</u> than or <u>equal</u> to the market price, you <u>are paid</u> the market price and switch groups: you swap places with the buyer of your group membership.

If you state that you would rather switch groups, you are then asked to state how much you are willing to **pay** to a member of the other group so that he or she swaps places with you. You can state any value between 0 and 48 points, and you are then a potential **buyer** for the membership of the other group. The market will set a price so that the number of sellers is equal to the number of buyers of membership of the other

group. If your value is <u>higher</u> than or <u>equal</u> to the market price, you <u>pay</u> the market price and switch groups: you swap places with the buyer of your group membership.

If, as the result of everyone's decisions, there are changes in group membership, it will still be the case that each group will be made by six participants each, since the only way of switching group is by swapping place with a member of the other group.

Timing: We ask you to make your market decisions in less than <u>four minutes</u>. Please stick to this timetable, as it is essential for the session to finish in about two hours as scheduled.

4. Payments

Round payments. The decisions that you and your coparticipants make will determine the amounts you gain as round payments. Specifically, at the end of the experiment a **winning round** is chosen at random from each stage and your earnings in each winning round are converted into pounds at the rate of 4 pence per experimental point.

Market payments. In addition, you are paid the 48 points you were given at the start of Stage 2, 3 and 4, plus any price that you have been paid in market tasks, minus any price that you have paid in market tasks. Again, at the end of the experiment points will be converted into pounds at the rate of 4 pence per experimental point.

Your final earnings will be equal to the sum of round payments and of market payments. Please remain seated until we come to your desk to give you the money.

Before starting to take decisions, we ask you to fill the enclosed questionnaire, with the only purpose of checking whether you have understood these instructions. Raise your hand when you have completed the questionnaire.