Measuring Identity*

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Abstract

Identity is a central concept in the social sciences. We present a laboratory experiment that measures the effects of induced group identity on participant social preferences. We find that when participants are matched with an ingroup member (as opposed to an outgroup member) they show more charity concerns when they have a higher payoff and less envy when they have a lower payoff. Likewise, while participants are more likely to reward an ingroup match for good behavior, they are less likely to punish an ingroup match for misbehavior. Furthermore, participants are significantly more likely to choose social-welfare-maximizing actions when matched with an ingroup member. All results are consistent with the notion that participants are more altruistic towards an ingroup match. As a result, ingroup matching generates significantly higher expected earnings.

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1 Introduction

Identity is a person's sense of self. When we belong to a group, we are likely to derive our sense of identity, at least in part, from that group. We also enhance our sense of identity by making favorable comparisons with outgroups, which reflects favorably on us. Social identity is used to explain many important real-world phenomena, such as ethnic and racial conflict, discrimination and education (Coleman 1961). It is one of the central concepts in psychology, sociology, political science and anthropology.

Social identity theory was developed by Tajfel and Turner (1979) to understand the psychological basis for intergroup discrimination. Social identity has three major components: categorization, identification and comparison. The first component, categorization, is the process of putting people, including ourselves, into categories. Labelling someone as a Muslim, a female, or a soldier are ways of saying other things about these people. Similarly, our self-image is associated with what categories we belong to. The second component, identification, is the process by which we associate ourselves with certain groups. Ingroups are groups we identify with, and outgroups are ones that we don't identify with. The third component, comparison, is the process by which we compare our groups with other groups, creating a favorable bias toward the group to which we belong. Tajfel *et al.* (1971) identify the minimal conditions that would lead to ingroup favoritism and outgroup discrimination. Numerous experiments in social psychology confirm Tajfel's finding that group membership creates ingroup enhancement in ways that favor the ingroup at the expense of the outgroup. In a typical minimal group experiment, subjects are randomly assigned to groups, which are intended to be as meaningless as possible. They then assign points to anonymous members of both their own group and the other group. Subjects tend to award more points to people who are identified as ingroup members.[1] Social identity theory has been tested in a wide range of fields and laboratory conditions and has a considerable impact on social psychology.

The systematic introduction of identity into economic analysis starts with Akerlof and Kranton (2000). In the utility function they propose, identity is associated with different social categories and how people in these categories should behave, i.e., a prescription or norm for behavior. Deviations from the prescription causes disutility. They then apply this model to analysis of gender discrimination, the economics of poverty and social exclusion, the household division of labor (Akerlof and Kranton 2000), the economics of education (Akerlof and Kranton 2002) and contract theory (Akerlof and Kranton 2005).

The models by Akerlof and Kranton incorporate identity into the neoclassical model of a self-interested agent, where the social norm (or prescription, or ideal) is exogenous. It is not specified in the models how social norms emerge and evolve. For example, once workers and managers identify with the firm, will the managers pay workers less as predicted by the theoretical model or more? In either situation, what reciprocal actions will the workers take? A more realistic and productive formalization of identity theory and its applications to economic domains needs to take seriously the impact of group identity on reciprocity, distributional concerns and the likelihood of social-welfare-maximizing actions, which are important dimensions of social preferences.

As we expect identity to play an increasingly important role in the economic models of incentive schemes and organizational design, it is crucial to systematically measure the effect of identity on social preferences.

In this paper, we use laboratory experiments to measure the effects of identity. Like many so-

[1] Experiments involving rating of ingroup and outgroup members have found that participants tend to rate ingroup members higher than outgroup members.

cial psychology experiments (Tajfel *et al.* 1971, etc.), we induce group identity using participant painting preferences. Unlike social psychology experiments which predominantly focus on allocation between other participants (the so-called other-other allocation), however, we use a much wider class of games, which allows us to systematically measure the effects of identity on various aspects of social preferences, such as difference aversion and reciprocity. Although ingroup favoritism and outgroup discrimination has been a very robust finding in the social psychology literature, little is known about how well it can be sustained when there is a conflict with self-interest. We choose a sample of simple games from Charness and Rabin (2002), incorporate identity into the social preference model, and estimate the effect of identity.

Specifically, we are interested in several questions. First, are participants more difference averse toward ingroup members than outgroup members? If so, to what extent? Second, are participants more likely to reciprocate positively towards ingroup members? Are they more likely to forgive or punish bad intentions from ingroup members? Third, are they more likely to choose social-welfare-maximizing actions when matched with an ingroup member compared to when matched with an outgroup member?

In this study, we find that, with induced identity, when matched with an ingroup member, participants show more charity when their payoffs are higher, and less envy when they are behind in earnings. The likelihood to reciprocate other's good intention or retaliate against other's bad behavior depends on the cost. Other things equal, participants are more likely to reciprocate positively to ingroup than to outgroup members. They are more forgiving towards bad behaviors from ingroup matches compared to outgroup matches. Furthermore, participants are significantly more likely to choose social-welfare-maximizing (hereafter shortened as SWM) actions when matched with an ingroup member. As a result, expected earnings are significantly higher when participants are matched with an ingroup rather than an outgroup member. Ingroup matching also yields significantly higher expected earnings than the control sessions in which no group identity was induced.

This paper is organized as follows. Section 2 reviews the experimental economics literature on social identity. Section 3 presents the experimental design. Section 4 presents the model and hypotheses. Section 5 presents the analysis and main results. Section 6 concludes.

2 Economics Experiments on Identity

There have been a number of economic experiments on group identity, using either natural or induced identities.

In economic experiments that incorporate natural identities, results are mixed. Brown-Kruse and Hummels (1993) and Cadsby and Maynes (1998) use a pre-game questionnaire to induce subject identities and find that gender does not have a significant effect. Solow and Kirkwood (2002) and Croson, Marks and Snyder (2003) find that the effect of gender on levels of contribution is significant. Croson, Marks and Snyder (2003) find that, in a threshold public goods game with multiple equilibria, coordination and group efficiency is increased among women who interact with members of a naturally occurring group, while the effects are opposite for men.

In addition to experiments designed to study the effects of natural identities, there is a large related literature on gender and economic decision making. We refer the reader to the surveys of Croson and Gneezy (2004) and Eckel and Grossman (forthcoming) for a detailed description of the main results.

One problem with using natural identities is that an individual's natural identity is associated with multiple social categories, therefore, various situations might determine which categories are most salient. For example, a participant might be Asian, female, an engineering student, and lesbian, and so on. Because of this potential ambiguity, another method which uses induced identities can give the experimenter more control over the identity formation process as well as the strength of participant identities.

Eckel and Grossman (2005) use induced team identity to study the effects of varying strength of identity on cooperative behavior in a repeated-play public goods game in the laboratory. They find that while cooperation is unaffected by simple and artificial team identity, actions designed to enhance team identity contribute to higher levels of team cooperation. This paper suggests that high degrees of team identification may limit individual shirking and free-riding in environments with a public good. Our experimental design is closely related to the strong identity treatments of Eckel and Grossman (2005).

3 Experimental Design

The experimental design reflects both theoretical and technical considerations. The design addresses the following objectives: to determine the effects of identity on various aspects of participant social preferences, to evaluate the effect of identity on social welfare, and to search for factors not considered in the standard theoretical framework that might also affect participant behavior.

The first design choice we face is whether to use participants' natural identities, such as race and gender, or to induce their identities in the laboratory. As introduced in the previous section, both approaches have been used in the lab. Because of the multi-dimensionality of natural identities and its potential ambiguous effects in the laboratory, we use induced identity, which gives the experimenter greater control.

There are three stages in the treatment sessions in our experiment. The first stage is a group assignment stage based on participant painting preferences. The second stage is an other-other allocation stage, where each participant allocates tokens to two other participants. The third stage is two-person sequential games.

In the first stage, subjects reviewed five pairs of paintings made by two modern artists, Klee and Kandinsky,[2] where in each pair one painting was made by Klee, and the other by Kandinsky. Without being told about the author who made each painting, participants reported independently which painting in each pair they preferred. Based on their reported painting preferences, subjects were divided into two groups, the Klee group and the Kandinsky group. Subjects were privately informed about their group membership and the number of people in their group. Groups remained the same throughout the experiment.

After being categorized into two groups, subjects were given the answer key to the first task and participated in a second task that involved group communication via a chat program on computers. The task was to answer two questions on which artist made each of two additional paintings. Given ten minutes, subjects voluntarily exchanged information with own-group members via a chat program, which may help one another obtain correct answers. Separate chat channels were used so information could only be shared within a group. Everyone's chat ID was a combination of the group name and her identification number of the experiment. For example, the chat ID

[2]Paul Klee (1879-1940) and Wassily Kandinsky (1866-1944) were two expressionist painters (see, e.g., Selz (1957). Their paintings were used by classic studies of group identity in social psychology (Tajfel et al. 1971).

for subject 1 was "Kan1" if she was from the Kandinsky group. Though almost any information was allowed during chatting, their conversation focused mainly on the paintings. Experimenters monitored the chat process from the server and log files were saved subsequently. Everyone was free to submit answers individually after chat. One hundred tokens were rewarded for each correct answer.

In the second stage, every subject was asked to allocate a given numbers of tokens between two other anonymous participants. No one was allowed to allocate tokens to herself. This feature of the experimental design is used widely in the minimal group paradigm in social psychology. Psychologists consistently find ingroup favoritism and outgroup discrimination, i.e., individuals allocate significantly more rewards to those from their own group and less to those from a different group. We adopt this design feature for two purposes, to replicate the finding in the social psychology literature, and to enhance group identity. Turner (1978) finds that this other-other allocation procedure, if followed by self-other allocation, can help enhance the sense of group identity.[3]

In our study, the stage of other-other allocations had five rounds. From round 1 to round 5, the total amount of tokens to be allocated increased from 200 tokens to 400 tokens with an increment of 50 tokens in each round. We used the strategy method to elicit participant strategy profiles. During each round, everyone decided how to allocate tokens between another two people under three scenarios, if both of them came from her own group, if both from the other group, and if one came from her own group and the other from a different group. It was public information that only one round of their decisions would be randomly selected by the computer to compute payoffs. At the end of Stage 2, a random sequence of ID numbers was generated by the computer to decide who allocated tokens to whom. Everyone allocated tokens between the two participants whose IDs directly followed hers in the sequence.[4] Therefore, one's payoff in this stage was the sum of the tokens allocated to her by the two people whose IDs preceded hers in the random sequence.

While the first two stages are designed to induce and enhance group identity, we use Stage 3 to investigate the impact of group identity on social preferences and economic outcomes. In Stage 3, subjects made decisions in a series of two-person sequential move games selected from Charness and Rabin (2002)[5] and our own extension of some of the games.

[Table 1 about here.]

Table 1 presents the set of games as well as the summary statistics for each game. We selected five two-person dictator games and sixteen two-person response games. Furthermore, to investigate the sensitivity of Player B's response to the cost in self-benefit, we added three games that were based on Berk31 (Charness and Rabin 2002) with a varied amount of Player B payoff. The two-person response games fall into three categories. For games in the first category, it is costless to B to help or punish A. For games in the second category, B needs to sacrifice her own self-interest to

[3]In Turner (1978), participants are asked to allocate tokens in two conditions. In one condition, everyone is asked to allocate awards to two other individuals (other-other) before dividing awards between herself and the other person with whom she is matched (self-other). In the other condition, the order is reversed. Turner finds an order effect on whether one is willing to trade self-interest for other's welfare. Ingroup favoritism is significant in the self-other choices if they are proceeded by other-other allocations. However, the ingroup favoritism is not significant when the order is reversed.

[4]For example, the first ID number drawn would be the ID of the person who allocated tokens between the two people who had the second and the third IDs, the second ID allocated between the third and the fourth IDs, and etc. The last ID drawn would allocate between the first and the second IDs.

[5]We thank Gary Charness for helping us select the games.

help A. For games in the third category, it is costly to B to penalize A. Subjects made decisions in seven to ten games in each session. For each game, each participant was randomly matched with another participant and they were randomly assigned role A or role B. No feedback was given until the end of the experiment. This procedure is similar to that in Charness and Rabin (2002). We used the strategy method and solicited participant decisions under two scenarios: if her match was from the same group, and if her match was from the other group. At the end of the experiment, two of the games were randomly selected by the computer to calculate the payoffs. This was also public information announced in the instructions. Experimental instructions are included in Appendix A.

The post-experiment survey contains questions about demographics, past giving behavior, strategies used during the experiment, group affiliation, and prior knowledge about the artists and paintings. The survey is included in Appendix B.

[Table 2 about here.]

Table 2 reports features of experimental sessions, including Session Number, Treatment or Control, Game Set, and Number of subjects per session, as well as the number of subjects we use in the analysis. Overall, 24 independent computerized sessions were conducted in the RCGD lab at the University of Michigan from January to July, 2005, yielding a total of 374 subjects. We used zTree (Fischbacher 1999) to program our experiments. Almost all our subjects were students from the University of Michigan.[6] Participants were allowed to participate only in one session.[7] Each treatment session lasted about one hour, whereas each control session lasted about thirty to thirty-five minutes. The exchange rate was set to 100 tokens for $1. In addition, each participant was paid a $5 show-up fee. Average earnings were $19.40 for treatment sessions and $14.40 for controls. Data are available from the authors upon request.

4 Hypotheses

In this section, we introduce our main hypotheses. In what follows, we state the null hypothesis formally and then the alternative hypothesis informally.

The first hypothesis relates to Stage 2 of the experiment in which participants were asked to allocate a fixed amount of money to two other participants. This type of allocation games is widely used in social psychology experiments on identity.

HYPOTHESIS 1 (Other-other Allocation). *In other-other allocations, participants will allocate the same amount of money to ingroup and outgroup members.*

Based on findings from the social psychology literature on identity, we expect that participants will allocate more money to ingroup members than outgroup members. That is, they will exhibit ingroup favoritism and outgroup discrimination.

We then consider the effects of group identity on participant distributional preferences. We first extend Charness and Rabin's social preference model to incorporate group identity. We then state a set of hypotheses based on the extended model.

In the two-person model of social preference developed by Charness and Rabin (2002), an individual's utility function is a weighted average of her own and her match's monetary payoffs.

[6]We have a few subjects who were staff members at the University.

[7]However, despite our announcement and screening, four subjects participated twice. In all analysis, we exclude the second time data from these subjects.

Let π_A and π_B be Player A and B's monetary payoffs, respectively. Let w_A denote the weight that Player B puts on A's payoff. Player B's preference is represented by:

$$\begin{aligned} u_B(\pi_A, \pi_B) &= w_A \pi_A + (1 - w_A)\pi_B & (1) \\ &= (\rho \cdot r + \sigma \cdot s)\pi_A + [1 - (\rho \cdot r + \sigma \cdot s)]\pi_B, & (2) \end{aligned}$$

where r is an indicator function for whether Player B is getting a higher payoff than Player A, $r = 1$ if $\pi_B > \pi_A$, and $r = 0$ otherwise; s is an indicator variable for whether Player B is getting a lower payoff than Player A, $s = 1$ if $\pi_B < \pi_A$, and $s = 0$ otherwise. Therefore, the weight B places on A's payoff, $w_A = \rho \cdot r + \sigma \cdot s$, may depend on the comparison between A's and B's payoffs. The parameter ρ measures B's charity concern when her payoff is higher than her match's, while σ measures B's behindness aversion (or envy) when her payoff is lower than her match's.

We incorporate group identity by redefining the weight that Player B puts on A's payoff as

$$w_A^I = \rho(1 + I \cdot a)r + \sigma(1 + I \cdot b)s, \quad (3)$$

where I is an indicator variable for whether Players B and A belong to the same social group, $I = 1$ if they belong to the same group, and $I = 0$ otherwise. The parameters, a and b, capture the additional ingroup effect for charity and behindness aversion, respectively. For example, when B is getting a higher payoff than A, the parameter ρ measures the charity effect for an outgroup match, while $\rho(1 + a)$ measures the charity effect for an ingroup match. The difference, a, measures the additional effect of ingroup identity on an individual's charity feelings. Therefore, the new utility function for Player B is

$$u_B(\pi_A, \pi_B) = w_A^I \pi_A + (1 - w_A^I)\pi_B. \quad (4)$$

The next two hypotheses concern distributional preferences.

HYPOTHESIS 2 (Charity). *With induced group identity, participants who are getting a higher payoff than their matches show the same charity concern towards ingroup and outgroup members, i.e.,* $a = 0$.

HYPOTHESIS 3 (Behindness Aversion). *With induced group identity, participants who are getting a lower payoff than their matches show the same behindness aversion towards ingroup and outgroup members, i.e.,* $b = 0$.

Although we are not aware of any direct measures of inequality aversion associated with group identity, a prominent social psychologist hypothesized that participants may be more inequality averse towards ingroup members.[8] This implies that a participant with a higher payoff than her match will show more charity concern towards an ingroup rather than an outgroup match ($a > 0$). Similarly, a participant with a lower payoff than her match will show more behindness aversion towards an ingroup than an outgroup match ($b > 0$).

Note that the original Charness and Rabin model has a negative reciprocity term that captures a person's tendency to punish bad behavior. We do not include it here. Instead, we will develop a separate empirical model of reciprocity, where the likelihoods of reward and punishment depend on the cost of reciprocity (see Section 5). The next two hypotheses look at the effects of group identity on the likelihood of positive and negative reciprocity.

[8]This is based on personal correspondence with Sara Kiesler.

HYPOTHESIS 4 (Positive Reciprocity). *With induced group identity, participants are equally likely to reward good behavior from an ingroup and an outgroup match.*

HYPOTHESIS 5 (Negative Reciprocity). *With induced group identity, participants are equally likely to punish unfair behavior from an ingroup and an outgroup match.*

With regard to reciprocity, to us, at least, it is ambiguous which direction the alternative hypotheses should go. It seems plausible that participants may be more likely to reward good intentions from an ingroup match. However, we can also imagine that one may take good behavior from an ingroup match for granted, and thus be less likely to reward in return. Similarly, when an ingroup match behaves badly, one could either be more forgiving and thus less likely to retaliate, or more hurt and thus more likely to retaliate. It is therefore especially important to examine the empirical evidence.

Hypothesis 6 states the effect of group identity on the likelihood of choosing social welfare maximizing actions.

HYPOTHESIS 6 (Social Welfare). *With induced group identity, participants are equally likely to choose social-welfare-maximizing actions when matched with an ingroup and outgroup person.*

If people care more about an ingroup match, we would expect that participants will be more likely to choose SWM actions when matched with an ingroup member.

The hypotheses above focus on social preferences. The next two hypotheses concern the effects of identity on earnings.

HYPOTHESIS 7 (Earning: ingroup vs. outgroup). *Participants receive the same expected earnings when matched with an ingroup or an outgroup member.*

The alternative hypothesis partly depends on how group identity affects people's tendency to reciprocate. If ingroup favoritism persists in the sequential games, we would expect that ingroup matching yields higher expected earnings than outgroup matching.

HYPOTHESIS 8 (Earning: identity vs. control). *Participants receive the same expected earnings when matched with an ingroup member in the treatment sessions or in the control sessions with no induced group identity.*

Again, if ingroup favoritism carries over to sequential games, we would expect that participants will receive higher expected earnings when matched with an ingroup member in the treatment sessions than in the control sessions with no induced group identity.

The last hypothesis concerns the strength of group attachment on behavior. Recall that group identity was induced in the first two stages of the experiment. In the first stage, participants chose paintings they preferred. Their group identity was then determined by their painting preferences. In the second stage, within each group, they used an online chat program to discuss which artist painted each of the two additional paintings. The chat stage can be used to detect different strengths of group identity, as we expect varying amount of involvement in the chat process.

HYPOTHESIS 9 (Group Attachment). *The strength of group identity has no effects on the likelihood that participants choose SWM actions when matched with an ingroup member.*

If the involvement in the chat stage is indeed an indicator of the strength of group identity, we expect that the more involved a participant is, the more likely she will choose SWM actions when matched with an ingroup member.

5 Results

We test the hypotheses in this section. We first examine the effects of group identity on other-other allocations. We then investigate how group identity affects participant social preferences, including distributional preferences, reciprocity and SWM behavior. Lastly, we look at the effects of attachment to group and demographics.

There are some common features that apply throughout our analysis. First, standard errors in the regressions are clustered at the individual level to control for the potential dependency of individual decisions across games.[9] Second, session dummies are included to control for session-specific effects. Third, we use a 5% statistical significance level (unless stated otherwise) to claim existence of any causal effects.

We first investigate whether participants show systematic ingroup favoritism when allocating tokens between two other individuals. Recall that, during each of the five rounds of other-other allocations, a participant needed to make decisions under three scenarios, if the two other individuals both came from her own group; if they both came from the other group; and if one came from her own group and one from the other group. Social psychology experiments demonstrate that participants allocate tokens equally between two other persons in the first two scenarios, while under the last scenario, they persistently give more tokens to the ingroup person than to the outgroup person. The main difference between the other-other allocation stage of our experiment and the social psychology experiments is that, in the former, the allocations do in fact translate into real monetary payoffs at a pre-announced fixed exchange rate, while, in the latter, the final monetary payoffs are usually determined randomly despite the announcement that they are tied to participants' decisions.

[Figure 1 about here.]

Figure 1 presents the average allocation across all sessions by round under each of the three scenarios. In all graphs, the horizontal axis is the number of rounds, while the vertical axis is the number of tokens allocated. The top panel presents average allocation to two other participants, both from ingroup. The middle panel exhibits average allocation to two other participants, both from outgroup. The bottom panel presents average allocation between two participants, one from ingroup and one from outgroup. The top and middle panels show that, on average, participants allocate almost an equal amount to two other individuals, if they both are from ingroup or outgroup. In the bottom panel, however, the average number of tokens allocated to an ingroup member (a diamond) is substantially more than that allocated to an outgroup member (a square).

[Table 3 about here.]

Information from the bottom panel of Figure 1 is also summarized in Table 3, which presents the average token allocation to an ingroup match (column 3) and to an outgroup match (column 4). Relative difference (column 6) measures the difference between tokens allocated between the ingroup and outgroup members, normalized by the total amount of tokens. It indicates that the difference in allocations is economically sizable. Regardless of the total amount of tokens, the relative difference seems to be stable, varying in the range between 35.2% and 41.1%.

[9] We do not cluster the standard errors at the session level, as participants made all their decisions independently, and they did not get any feedback on their decisions until the end of the experiment.

Result 1 (Other-Other Allocation). *When allocating a fixed amount of money between two other individuals, one allocates significantly more money to an ingroup member than to an outgroup member. The relative difference is between 35.2% and 41.1%.*

Support. *In Table 3, column 5 presents t-statistics for one-tailed tests on the difference between column 3 and 4 for paired samples. Average allocation to an ingroup match is substantially greater than that to an outgroup match. The difference is statistically significant at the 1% level in all cases.* ∎

By Result 1, we reject Hypothesis 1. Therefore, with real (rather than hypothetical) incentives and grouping of participants based on their true painting preference, we are able to reproduce the same result of ingroup favoritism as in the minimal group paradigm experiments in social psychology.

Whether the ingroup favoritism still persists when there is a conflict between self-interest and others' welfare is more interesting to economists. More generally, we are interested in how group identity affects various dimensions of social preferences. We measure these effects through 24 sequential games.

Summary statistics of the sequential games are presented in Table 1. The entries represent the fraction of participants choosing an action. Two immediate observations are robust across games. First, the proportion of participants choosing a particular strategy is different between ingroup and outgroup matches. Furthermore, in most games, the proportion in the control sessions lies between that of the ingroup and outgroup matches. In what follows, we examine the effects of group identity on participant social preferences, in terms of their distributional preferences, reciprocity as well as SWM propensities.

We first analyze the effect of group identity on distributional preference, i.e., charity and behindness aversion, by assuming no reciprocity. We use Player B's data from the sequential games to estimate the parameters of Equation (4). We perform maximum-likelihood estimation on our binary-response data using a logit specification:

$$\text{Prob(action 1)} = \frac{e^{\gamma \cdot u(action1)}}{e^{\gamma \cdot u(action1)} + e^{\gamma \cdot u(action2)}}, \tag{5}$$

where the parameter γ reflects the sensitivity of the choices to differences in utility. When $\gamma = 0$, this model is reduced to random choice with equal probability. When γ is arbitrarily large, the probability of choosing the action with higher utility approaches one. In general, the higher the value of γ, the sharper the predictions (McFadden 1981).

[Table 4 about here.]

Table 4 reports the results of parameter estimation. As a benchmark, we estimate the charity and behindness aversion (or envy) parameters for the control sessions. For the treatment sessions, we report the parameter estimates for both ingroup and outgroup matching as well as their differences represented by parameters a and b. We now summarize our main results based on the estimates.

Result 2 (Charity). *When their match gets a lower payoff, participants show charity concerns. Their charity towards an ingroup match is significantly greater than that towards an outgroup match.*

Support. *In Table 4, the charity parameter ρ is 0.427 for the control sessions. In the treatment sessions, $\rho_o = 0.323$ for outgroup matches, and $\rho_i = \rho_o(1 + a) = 0.474$ for ingroup matches. All estimates are statistically significant at the 1% level. The effect of group identity on charity is measured by the parameter a. It is 0.467 and statistically significant at the 1% level.* ∎

By Result 2, we reject Hypothesis 2 at the 1% level in favor of the alternative hypothesis that participants are more charity-concerned towards an ingroup match. In addition, the estimated charity parameter from control sessions lies between the ingroup and outgroup estimates.

Result 3 (Behindness Aversion). *When getting a lower payoff than their match, participants exhibit behindness aversion. However, with induced group identity, participants show significantly less behindness aversion towards an ingroup than an outgroup match.*

Support. *In Table 4, the estimate of the behindness aversion parameter σ is -0.049 in the control sessions. In treatment sessions, $\sigma_o = -0.112$ for outgroup matches, whereas $\sigma_i = \rho_o(1 + b) = -0.008$ for ingroup matches. The parameter estimates are statistically significant at the 5% level for the control and 1% level for the outgroup matching. We can not reject that it is different from zero for the ingroup matching. The identity parameter, $b = -0.931$ ($p < 0.01$), indicates that ingroup matching significantly reduces behindness aversion.* ∎

By Result 3, we reject Hypothesis 3 at the 1% significance level. Contradicting our prior that ingroup matching increases behindness aversion, the result indicates that group identity has the opposite effect. When participants have a lower payoff than their ingroup match, they feel less envious.

Together, Results 2 and 3 suggest that group identity does *not* make people more inequality averse. The effects are different depending on the relative positions. Participants show more charity, but *less* behindness aversion when matched with an ingroup member. Both effects, however, are consistent with putting more weight on an ingroup match's payoff, compared to the control and outgroup matching.

In addition to distributional concerns, people's behavior may also be affected by the intentions of others. In our games, Player B's choice may be affected by Player A's intentions which is reflected by A's decision to enter or opt out. When A's choice shows good intentions, it is likely that B will reward A by choosing an action that benefits A. Alternatively, Player B may punish A for her bad behavior, sometimes even at the cost of own monetary payoffs. The overview of statistic summary on the games suggests that the likelihood of reward or retaliation depends on the cost of the action.

			Ingroup		Outgroup		Control	
	If A stays out	If A enters, B chooses	Left	Right	Left	Right	Left	Right
Resp. 1	(750,0)	(400,400) vs. (750,400)	0.35	0.65	0.55	0.45	0.32	0.68
Resp. 2a	(750,0)	(400,400) vs. (750,375)	0.72	0.28	0.85	0.15	0.73	0.27

Consider game Resp.1 and Resp.2a above (taken out of Table 1). In both games, Player A can choose to enter to help B or to stay out with a guaranteed 750 tokens. Two games share a similar payoff structure except for Player B's cost to reward A. The cost is zero in game Resp.1 and 25 tokens in Resp.2a. The fractions of Player B's who chose Left or Right are presented on the right side of the table. What stands out from the summary statistics is that a cost of 25 tokens significantly reduces the fraction of rewarding choices by Player B's. The drop is dramatic, 0.37 for ingroup matching, 0.30 for outgroup matching, and 0.41 for the control sessions. Furthermore, the statistics confirm ingroup favoritism. Player B's are more likely to reward an ingroup match. The fraction of rewarding is 0.65 for ingroup matches and 0.45 for outgroup matches, when it costs nothing to do so. When it costs 25 tokens, the likelihood of rewarding is still 13 percentage points higher for an ingroup match compared to an outgroup match.

			Ingroup		Outgroup		Control	
	If A stays out	If A enters, B chooses	Left	Right	Left	Right	Left	Right
Resp 13a	(750, 750)	(800,200) vs. (0,0)	0.98	0.03	0.88	0.13	0.91	0.09
Resp 13b	(750, 750)	(800,200) vs. (0,50)	0.93	0.08	0.8	0.2	0.83	0.17
Resp 13c	(750, 750)	(800,200) vs. (0,100)	0.88	0.13	0.7	0.3	0.78	0.22
Resp 13d	(750, 750)	(800,200) vs. (0,150)	0.75	0.25	0.65	0.35	0.91	0.09

Similarly, Player B's choice of retaliating A's bad behavior is also cost sensitive. Consider games Resp 13a, Resp 13b, Resp 13c, and Resp 13d in the above subset of Table 1. These four games have the same payoff structure except for the cost of punishment. In Resp 13a, it costs Player B 200 tokens to punish Player A's misbehavior. This cost decreases by 50 tokens in each subsequent game. The data summary shows that the proportion of Player B's who choose the Pareto-damaging action gradually increases as the cost of punishment decreases. With an ingroup match, this proportion increases from 0.03 to 0.25 when the cost drops from 200 tokens in Resp 13a to 50 tokens in Resp 13d. With an outgroup match, this proportion rises from 0.13 to 0.35. Furthermore, the likelihood of retaliation is consistently higher in outgroup matching than in ingroup matching, and the difference is at least 0.10.

To formally investigate reciprocity and the effects of group identity, we use a probit model. Rather than pooling all games together, we examine positive and negative reciprocity by focusing on the two subsets of games separately. In games of positive reciprocity, Player A's entry is associated with good intentions, whereas in games of negative reciprocity, A's entry reflects bad intentions.

In games in which Player A's entry shows intention to help B, B's choice of reciprocating involves a cost-benefit analysis that should include three factors, B's benefit from A's entry, B's cost to reciprocate A, and A's benefit from B's reciprocation. The first factor is measured by the difference between B's expected payoff if A enters and B's payoff if A chooses to stay out.[10] B's cost of reciprocation is measured as the difference in Player B's payoffs between the reciprocating action and the alternative. Player A's benefit from B's reciprocation is computed as the gain in A's payoff if B chooses to reciprocate as supposed to not reciprocating. We estimate the effect of these three variables using data from the control and treatment sessions separately. In the regression for the treatment sessions, we include the dummy variable for ingroup matching based on our conjecture that ingroup matching should be positively associated with the likelihood of positive reciprocity.

[Table 5 about here.]

[10] Player B's expected payoff if A enters is computed by assuming that B1 and B2 are equally likely to be chosen.

Table 5 presents the results of the probit model. Specifications (1) and (2) present models of positive reciprocity for the control and treatment sessions, respectively. We find that Player B values benefit brought by Player A's entry. The more she benefits, the more likely she will reciprocate. On the other hand, the cost of reciprocation reduces the likelihood that Player B rewards A. These effects are statistically significant at the 1% level in the control sessions (column 1) and at the 10% level in the treatment sessions (column 2). The potential benefit to Player A if Player B reciprocates has little effect on the likelihood of reciprocation. Consistent with our expectation, ingroup matching significantly increases the likelihood Player B's positive reciprocity.

Similarly, if Player A's entry is Pareto-damaging, the likelihood of B's retaliation depends on three factors, B's loss from A's entry, B's cost for retaliation, and A's damage from retaliation. These three variables are measured in a similar way as in the positive reciprocity games. The results for the control and treatment sessions are presented in columns (3) and (4) of Table 5. Results show that the cost of retaliation substantially lowers the probability of retaliation. The negative effect of cost is statistically significant at the 5% level in the treatment results. The effect of potential damage to Player B due to A's entry has a wrong sign, but is not significant in specification (3), and marginally significant ($p < 0.10$) in specification (4). Furthermore, the magnitude of the coefficient is small in both specifications. We also find that the ingroup matching significantly reduces the likelihood of retaliation. It implies that Player B is on average more forgiving towards Player A's misbehavior if A is from the same group as B.

Result 4 (Reciprocity). *Participant reciprocity preference is significantly different between ingroup and outgroup matches. Participants are more likely to reward an ingroup than an outgroup match for their good behavior. They are significantly more forgiving towards misbehaviors from an ingroup match compared to an outgroup match. The cost of reciprocation significantly lowers the likelihood of reward or punishment.*

Support. *In Table 5, the coefficients of the ingroup match variable are* 0.502 *(*$p < 0.01$*) for specification (2) and* -0.524 *(*$p < 0.01$*) for specification (4). For positive reciprocity, the coefficients for the cost variable are negative and significant at the 1% level for control and 10% level for treatment sessions. For negative reciprocity, they are* -0.553 *(*$p > 0.10$*) in the control sessions,* -0.688 *(*$p < 0.05$*) in the treatment sessions.* ∎

By Result 4, we reject hypotheses 4 and 5. Like effects of identity on distributional preferences, the effects of group identity on reciprocal preferences are also asymmetric. Participants are more likely to reward an ingroup member's good behavior. However, they are less likely to punish an ingroup member's misbehavior. Both are again consistent with putting more weight on an ingroup match's payoff compared to an outgroup match's payoff.

A third important element in social preference is the tendency to choose SWM actions. We compute the proportion of participants who made the SWM decisions for both the control and treatment sessions. In doing this, we exclude three games, Dict 5, Resp 5a and 5b, and role B in game Resp 9 as the outcomes in these games have the same aggregate payoffs. Results are presented in Table 6. Game-by-game results are not presented due to space limitations, but are available from the authors upon request.

[Table 6 about here.]

Table 6 reports the proportion of SWM decisions for Players A, B and overall players, for three conditions: ingroup matching (column 2), outgroup matching (column 3), and control sessions (column 4). Column 5 presents the alternative hypothesis that participants are more likely to choose SWM decisions when matched with an ingroup member than when matched with an outgroup member, as well as the p-values for paired-sample t-tests for Players A, B and overall. Column 6 presents the alternative hypothesis that participants are more likely to choose SWM decisions when matched with an ingroup member than in control sessions, as well as the p-values for t-tests of proportions. The last column presents the test results for the alternative hypothesis that outgroup matches are less likely to lead to SWM outcomes than control sessions.

Result 5 (Social Welfare Maximization). *Both Players A and B are significantly more likely to choose SWM decisions when matched with an ingroup member than when matched with an outgroup member. Compared with the control session where no group identity is induced, participants are more likely to choose SWM decisions if matched with an ingroup member, but less likely to do so if matched with an outgroup member.*

Support. *Column 5 in Table 6 presents the p-values for paired-sample t-tests,* $p < 0.01$*, for Players A, B and overall, comparing the proportion of SWM decisions for ingroup vs. outgroup matchings. Column 6 presents the p-values for t-tests of proportions,* $p < 0.05$ *for Player A and overall, whereas* $p < 0.10$ *for Player B, comparing ingroup vs. control sessions. Column 7 presents the p-values for t-tests of proportions,* $p < 0.05$ *for Players A, B and overall, comparing outgroup vs. control sessions.* ∎

By Result 5, we reject Hypothesis 6 in favor of the alternative hypothesis that group identity has a significant effect on the likelihood of SWM decisions. Comparing the treatment with control sessions where there does not exist the group differentiation, we find that participants are significantly more likely to choose SWM action for the ingroup matches, but withdraw concerns for the outgroup match.

Given all the above results on the effect of social identity on various aspects of participant's social preferences, we expect that it will have an effect on the final payoff. To extract the maximum information out of the data, we use simulations to compute each participant's expected payoff when she is matched with every member of the opposite role in her session. For example, in the actual experiment, a Player A is randomly matched with one Player B in her session and the payoffs for both players are determined by their stated strategies. In the simulation, however, a Player A is hypothetically matched with every Player B in her session. Her expected payoff is the average payoff she gets from each match based on their group identities and strategy profile. We compute the expected earnings for all players and present the results across all games in Table 7.[11]

[Table 7 about here.]

Table 7 reports the expected earnings for Players A, B and over all players, for three matching conditions: ingroup (column 2), outgroup (column 3), and control sessions (column 4). Column 5 to 7 present the alternative hypotheses, as well as the p-values for paired-sample t-tests for Players A, B and overall.

Result 6 (Earnings). *Participants' expected earnings are significantly higher when they are matched with an ingroup member than an outgroup member. Compared to the control sessions, ingroup matching yields overall slightly higher expected earnings whereas outgroup matching yields significantly lower expected earnings.*

[11] Game-by-game comparisons is not presented due to space limitations, but are available from the authors upon request.

Support. *Column 5 in Table 7 presents the p-values for paired-sample t-tests,* $p < 0.01$ *for Player B and overall and* $p < 0.10$ *for Player A , comparing expected earnings from matching with an ingroup vs. an outgroup member. Comparison between column 2 and 4 shows that ingroup matching is associated with slightly higher expected earnings than control sessions. The difference is marginal. It is statistically significant at the 10% level only for Player B. For Player A and overall, we fail to reject the null hypothesis that they are equal. Column 7 presents the p-values for the equality of mean tests,* $p < 0.05$ *for Player B and overall, comparing expected earnings from outgroup matching vs. control sessions. We can not reject that the expected earnings are equal for Player A at the conventional statistical significance level.* ∎

As shown above, the induced group identity introduces a gap in the expected earnings between the ingroup and outgroup matching. To a greater extent, the gap comes from the expected loss in outgroup matching than from the expected gain in ingroup matching, in comparison to the control cases with no group differentiation. In other words, the expected economic outcome from with ingroup matching is made only marginally better than the case with absence of group categorization. Nevertheless, outgroup matching does make agents suffer substantially in the expected earnings compared to the scenario where there is no group.

We now examine effect of the strength of group attachment. We are interested in whether a stronger group identity enhances the likelihood of choosing a SWM outcome for an ingroup match. We have three measures to proxy the strength of group identity, number of lines a participant entered during the chat, number of words during chat, and the self-reported attachment in the post-experiment survey. We use data from all games except Dict 5, Resp 5a and 5b, and role B in game Resp 9, as all outcomes within each game yield the same aggregate payoff.

[Table 8 about here.]

Table 8 reports the results of probit analysis on the effects of group attachment on the likelihood of SWM actions. The dependent variable is the likelihood of A and B choosing SWM outcomes. The key independent variable is ingroup match. In column (1)-(3), other covariates include the interaction term of ingroup match and a proxy measure of group attachment, and a dummy variable for role A. In column (4)-(6), we further control for demographics. Our demographic variables include age, gender, number of siblings, and racial backgrounds. Since we use the strategy method, each subject is associated with two observations in every regression. Observations are hence clustered on the individual subject level. In all specifications, we include session dummies and game dummies to control for session-specific or game-specific effects. Coefficients of these dummy variables are omitted for brevity. Results in all specifications confirm Result 5 that one is more likely to choose the SWM action if matched with an ingroup member. We find some evidence that the strength of identity increases the likelihood of SWM actions. The interaction term of ingroup match and the group attachment enters with a positive sign. It implies that the stronger the group attachment, the more salient the effect of ingroup match on the SWM actions. However, its effect shows statistical significance at the 10% level or better only when the self-reported attachment score is used. It implies that the intensity of involvement in the Chat program, measured either as the number of lines or words typed, does not serve as a direct predictor for the strength of group attachment. Using self-reported attachment score slightly lower the size of the coefficient of ingroup match. Moreover, we find that Player A's are substantially less likely to choose SWM action than Player B's.

We also investigate whether other ingroup members' involvement in the Chat program have any effect on one's own choice. The estimated effect is basically zero. Whether we include or drop the variable barely changes the results.

Result 7 (Strength of Group Attachment). *The effect of ingroup matching on the likelihood of choosing SWM actions increases significantly with the self-reported group attachment scale.*

Support. *In Specification (3) and (6) in Table 8, coefficient for (ingroup match)*(self-reported attachment) is positive and significant at the 10% and 5% level, respectively.* ∎

In Specification (4)-(6), we control for demographic characteristics, for example, age, gender, number of siblings and racial background. The question on racial background in the post-experiment survey provides five categories, white, black, Hispanic, Asian, or Other.[12] In the regression, white is treated as the omitted category.

Result 8 (Demographics). *Male participants are significantly more likely to choose SWM actions. Compared to white participants, Hispanics and Other are significantly less likely to choose SWM outcomes.*

Support. *Table 8 reports the effects of demographics variables. The effect of the Male variable is positive and statistically significant at the 1% level. Both Hispanics and Other enter with a negative sign. The effect of Hispanic is statistically significant at the 10% level whereas the effect of Other is at the 5% level.* ∎

Result 8 indicates that some natural identities have significant effects on social preferences. However, the coefficients and standard errors of the ingroup-match variable are consistent with or without the inclusion of demographics, indicating that the effects of induced identity are robust in the presence of natural identities. This, in turn, empirically validates the induced identity method in the laboratory.

In this section, we examined effects of group identity on three aspects of social preference, including distributional, reciprocal preferences and social welfare maximization. With induced identity, when matched with an ingroup member, participants show more charity when they have a higher payoff than their match, and less envy when they have a lower payoff. The likelihood to reciprocate others' good intention or retaliate against others' bad behavior is sensitive to the cost of reciprocation. Other things equal, participants are more likely to reciprocate positively to an ingroup than to an outgroup member. They are more forgiving towards bad behaviors from ingroup matches compared to outgroup matches. Furthermore, participants are significantly more likely to choose SWM actions when matched with an ingroup member. As a result, expected earnings are significantly higher when participants are matched with an ingroup. While ingroup matching yields significantly higher expected earnings than the control group, outgroup matching yields significantly lower expected earnings.

6 Conclusion

Social identity theory has been fruitfully applied to a broad array of topics across the social sciences, including prejudice, stereotyping, social competition, negotiation, language use, motivation

[12] Participants who choose Other are asked to specify. Participant racial composition is 46.2% white, 27.2% Asian, 17.2% black, 2.7% Hispanic, and 6.78% Other.

and commitment, collective action, and industrial protest (Haslam 2004), and has helped us understand important aspects of social behavior. Although it was only recently introduced into economics (Akerlof and Kranton 2000), it has the potential to shed light on many interesting economic issues and provide a novel and refreshing alternative to established theories.

Existing empirical work on social identity theory focuses mostly on games of interest to psychologists and sociologists, most notably the other-other allocation games, where participants' own benefits are not affected by their allocation decisions. To formalize identity theory mathematically and use it to analyze economic problems, it is important to systematically measure the effects of identity in the economic domain. This paper does this by investigating the effects of identity on social preferences through two-person sequential games in the laboratory.

In our experiments, we induce group identity based on features of the minimal group paradigm. In particular we use the classic Klee-Kandisky painting preferences to classify groups, and let participants go through the other-other allocation games used widely in social psychology, followed by the self-other sequential allocation games. We use the latter to measure the effects of identity on various aspects of social preference, including distributional, reciprocal and SWM dimensions.

One might hypothesize that people will simply become more inequality averse when matched with an ingroup member, i.e., they will show more charity and more behindness aversion. Interestingly, the effect is asymmetric. Indeed, we find that when participants are matched with an ingroup member (as opposed to an outgroup member), they show more charity when they have a higher payoff, however, they show *less* behindness aversion when they have a lower payoff. Both results are consistent with participants putting more weight on the match's payoff in their own utility function.

We also present the first empirical evidence for the effects of identity on participant reciprocal preferences. Rather than taking an ingroup match's good intentions for granted, participants are significantly more likely to reward an ingroup match for their good behaviors, compared to an outgroup match. Furthermore, they are less likely to punish an ingroup match for misbehaviors. Again, in reciprocal preferences, participants are less willing to withdraw concern for an ingroup match. When we systematically vary the cost of reciprocation, we find that an increase in cost significantly decreases the likelihood of rewards or punishments.

In the third dimension of social preferences, participants are significantly more likely to choose SWM actions when matched with an ingroup member. As a result, ingroup matching generates significantly higher expected earnings.

This paper makes two contributions to the economics literature. The first contribution is to lay down the empirical foundation for incorporating identity into economic models. One of the areas in which social identity theory might prove especially valuable is the economics of organizations. Our results suggest that instead of modeling identity as a substitute for monetary rewards and thus a cost-saving device (Akerlof and Kranton 2005), a more prominent effect of identity is the increased likelihood of SWM actions, more positive reciprocity and less Pareto-damaging negative reciprocity.

This paper also has practical implications for organizational design. The traditional approach on mechanism design in economics relies heavily on incentives derived from Taylorism. However, this theory is silent about whether it is a worthwhile investment for employers to create a deep sense of identity among employees within the firm, despite the fact that examples of identity creation abound. Nike founder Phil Knight and many of his employees have tatoos of the Nike "swoosh" logo on their left calves as a sign of group membership and cameraderie (Camerer and Malmendier 2005). Standard economic theory does not have an explanation for such phenomena. Our results suggest that creating a group identity would induce people to be more helpful to each other, and to increase the likelihood of SWM actions, which would improve payoffs for all relevant parties, the principal (firm) as well as the agents (workers).

There are several directions for fruitful future research. On the theory front, a formalization of identity and its applications to various domains of organization design, which goes beyond cost savings, would help us better understand the power of social identity on optimal contract and organizational hierarchies. On the empirical front, it would be interesting to explore the impact of social identity in the practical mechanism design in the laboratory and the field.

APPENDIX A. Experimental Instructions

This is the experimenter's copy of instructions. Materials inside the square brackets are not displayed on the subject instructions. Beginning at Part 2, the participant has a banner displaying the group she belongs to at the top of every screen, which is not displayed here. In Part 3, we present the instructions on the sequential games using two games as examples. Instructions for other treatment sessions are identical except that the set of games are different as presented in Table 1. Instructions for the control sessions are identical to Part 3 of the experiment except that the choices are not conditional on the group composition.

[New Screen]

This is an experiment in decision-making. The amount of money you earn will depend upon the decisions you make and on the decisions other people make. Your earnings are given in tokens. This experiment has 3 parts and 16 participants. Your total earnings will be the sum of your payoffs in each part. At the end of the experiment you will be paid IN CASH based on the exchange rate

$1 = <u>100</u> tokens.

In addition, you will be paid $5 for participation. Everyone will be paid in private and you are under no obligation to tell others how much you earn.

Please do not communicate with each other during the experiment. If you have a question, feel free to raise your hand, and an experimenter will come to help you.

[New Screen]

In Part 1 everyone will be shown 5 pairs of paintings by two artists. You will be asked to choose which painting in each pair you prefer. You will then be classified into one of two groups, based on which artist you prefer. Then you will be asked to answer questions on two other paintings. Each correct answer will bring you additional tokens. You may get help from or help other members in your own group while answering the questions.

The participants you are grouped with will be the same for the rest of the experiment.

After Part 1 has finished, we will give you instructions for the next part of the experiment.

[Waiting Screen]

[New Screen]

Now please choose which painting you prefer by clicking on either A or B from each pair.

After everyone submits answers, you will be privately informed of which group you are in.

Pair #1	1A (radio button)	1B (radio button)
Pair #2	2A (radio button)	2B (radio button)
Pair #3	3A (radio button)	3B (radio button)
Pair #4	4A (radio button)	4B (radio button)
Pair #5	5A (radio button)	5B (radio button)

[Waiting Screen]

[New Screen]

Based on your choices, you prefer the paintings by __ (Kandinsky or Klee).
You are assigned to the __ (Kandinsky or Klee) group.
The number of people in your own group is __.

[Waiting Screen]

[New Screen]
You will now receive two more paintings, painting #6 and #7. Please select the artist who you think made the paintings, respectively. For each correct answer, you will be rewarded with an additional 100 tokens. You may find the answer key to the 5 pairs of paintings useful.

Meanwhile, **you can use a group chat program to get help from or offer help to other members in your own group.** Except for the following restrictions, you can type whatever you want in the lower box of the chat program. **Messages will be shared** *only* **among all the members from your own group.** You will not be able to see the messages exchanged among the other group. People in the other group will not see the messages from your own group either.

Restrictions on messages

1. Please do not identify yourself or send any information that could be used to identify you (e.g. age, race, professional background, etc.).
2. Please refrain from using obscene or offensive language.

How to use the chat program

- Press Alt+Tab to switch to the chat program.
- Please wait while one of the experimenters comes to enter your ID number for you in the chat program.
- You can press Alt+Tab at any time to switch back and forth between the chat program and the decision screen.
- You will be given 10 minutes to communicate with your group members.

Please raise your hand if you have any questions.
My answers are:

Painting #6 is made by	Klee (radio button)	Kandinsky (radio button)
Painting #7 is made by	Klee (radio button)	Kandinsky (radio button)

[New Screen]
Please switch to the chat program by pressing Alt+Tab and close it.
You will find out your payoff from Part 1 at the end of the experiment.

[Waiting Screen]

[New Screen]
Now we start Part 2 of the experiment. You will be asked to make decisions in 5 rounds. In each round, you will have a certain number of tokens. The number varies from round to round. You will be asked to allocate these tokens between two other participants under three scenarios

1. if both are from your own group,
2. if both are from the other group, or
3. if one is from your group, and one is from the other group.

For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.* Your answers will be used to determine other participants' payoffs. Similarly, your payoff will be determined by others' allocations.

After everyone finishes recording their decisions, the computer will randomly select a round among the five rounds that is used to calculate the payoffs. Each round of decisions will have an equal chance of being chosen.

Next, the computer will generate a random sequence of the ID numbers. The first number in the sequence will be the ID number of the person who allocates to the second and third IDs. The second ID drawn will allocate to the third and fourth IDs, , and so on. The last ID will allocate to the first and second IDs. Therefore, your payoff will be the sum of tokens allocated to you by the two participants preceding you.

For example, the computer generates the following sequence of the ID numbers, 9, 4, 1, 5, 12, $\cdots$, 2, and 3. Then subject 9 will allocate tokens to subject 4 and 1. Subject 4 will allocate tokens to subject 1 and 5, $\cdots$, and so on. Subject 3 will allocate to subject 9 and 4. Therefore, subject 1's payoff will be the sum of the tokens allocated to her by subject 9 and subject 4.

[New Screen]

Please record your decisions under the three scenarios below.

Note: For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.*

Round 1

	A		B	
	A from your own group		B from your own group	
i)	( )	+	( )	= 200 tokens
	A from the other group		B from the other group	
ii)	( )	+	( )	= 200 tokens
	A from your own group		B from the other group	
iii)	( )	+	( )	= 200 tokens

[New Screen]

Please record your decisions under the three scenarios below.

Note: For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.*

Round 2

	A		B	
	A from your own group		B from your own group	
i)	( )	+	( )	= 250 tokens
	A from the other group		B from the other group	
ii)	( )	+	( )	= 250 tokens
	A from your own group		B from the other group	
iii)	( )	+	( )	= 250 tokens

[New Screen]

Please record your decisions under the three scenarios below.

Note: For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.*

Round 3

	A from your own group		B from your own group	
i)	( )	+	( )	= 300 tokens
	A from the other group		B from the other group	
ii)	( )	+	( )	= 300 tokens
	A from your own group		B from the other group	
iii)	( )	+	( )	= 300 tokens

[New Screen]

Please record your decisions under the three scenarios below.

Note: For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.*

Round 4

	A from your own group		B from your own group	
i)	( )	+	( )	= 350 tokens
	A from the other group		B from the other group	
ii)	( )	+	( )	= 350 tokens
	A from your own group		B from the other group	
iii)	( )	+	( )	= 350 tokens

[New Screen]

Please record your decisions under the three scenarios below.

Note: For each scenario, you must allocate *all* tokens between the two participants. Allocations have to be integers. *Do not allocate any tokens to yourself.*

Round 5

	A from your own group		B from your own group	
i)	( )	+	( )	= 400 tokens
	A from the other group		B from the other group	
ii)	( )	+	( )	= 400 tokens
	A from your own group		B from the other group	
iii)	( )	+	( )	= 400 tokens

[New Screen]

You will find out your payoff from Part 2 at the end of the experiment.

[New Screen]

Now we start Part 3 of the experiment. You will make decisions in 7 different games. Each decision and outcome is independent of each of your other decisions, so that your decisions and outcomes in one game will not affect your outcomes in any other game.
In every game, you will be anonymously matched with one other participant. You will then be asked to make a decision under two scenarios

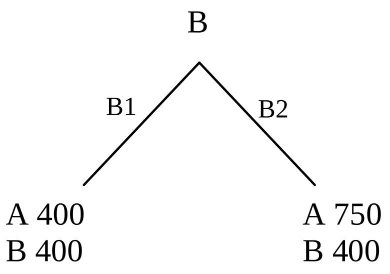
1. if your match comes from *your own group*;

2. if your match comes from *the other group*.

For every decision task, you will be randomly matched with a different participant than in the previous decision. Your decision may affect the payoffs of others, just as the decisions of your match may affect your payoffs.
There are roles in each game, A or B. Some games only have decisions for one role whereas other games have multiple decisions. In games with multiple decisions, these decisions will be made sequentially, in alphabetical order: person A will make a decision first and, next, person B will make a decision.
You will not be informed of the results of any previous period or game prior to making your decision.
Only two out of the seven games played will be randomly selected by the computer for computing payoffs. Each game is equally likely to be drawn.
We will proceed to the decisions once the instructions are clear. Are there any questions?

[New Screen, Game 1, Player A]

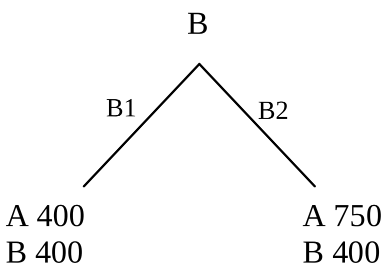
In this period, you are person A.
You have no choice in this game.
Person B's choice determines the outcome.
If person B chooses B1, you will each receive 400.
If person B chooses B2, you will receive 750, and person B will receive 400.



I have no choice in this game. Okay

[New Screen, Game 1, Player B]

In this period, you are person B.
You may choose B1 or B2.
Person A has no choice in this game.
If you choose B1, you will each receive 400.
If you choose B2,person A will receive 750 and you will receive 400.

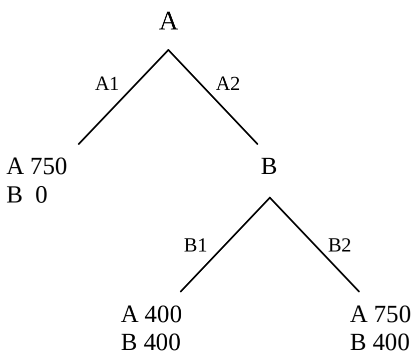


Decision
If person A is from my own group, I choose B1 (radio button) or B2 (radio button).
If person A is from the other group, I choose B1 (radio button) or B2 (radio button).

Submit

[New Screen, Game 3, Player A]

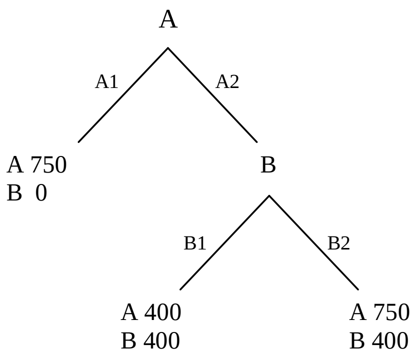
In this period, you are person A. You may choose A1 or A2.
If you choose A1, you will receive 750, and person B will receive 0.
If you choose A2, then person B's choice of B1 or B2 will determine the outcome. If you choose A2 and person B chooses B1, you will each receive 400. If you choose A2 and person B chooses B2, you will receive 750, and s/he will receive 400.
Person B will make a choice *without* being informed of your decision. Person B knows that his or her choice only affects the outcome if you choose A2, so s/he will choose B1 or B2 on the assumption that you have chosen A2 over A1.



Decision
If person B is from my own group, I choose A1 (radio button) or A2 (radio button).
If person B is from the other group, I choose A1 (radio button) or A2 (radio button).

Submit

[New Screen, Game 3, Player B]
In this period, you are person B. You may choose B1 or B2.
Person A has already made a choice. If s/he has chosen A1, s/he will receive 750, and you will receive 0. Your decision only affects the outcome if person A has chosen A2. Thus, you should choose B1 or B2 on the assumption that person A has chosen A2 over A1.
If person A has chosen A2 and you choose B1, you will each receive 400. If person A has chosen A2 and you choose B2, then person A will receive 750, and you will receive 400.



Decision
If person A is from my own group, I choose B1 (radio button) or B2 (radio button).
If person A is from the other group, I choose B1 (radio button) or B2 (radio button).

Submit

[New Screen]
You will find out your payoff from Part 3 at the end of the experiment. OK

[New Screen]

In Part 1, the correct answers to the two painting questions are

#6 by Klee

#7 by Kandinsky.

Your payoff from Part 1 is __ tokens.

In Part 2, round __ is selected to compute the payoffs.
The sequence of the ID numbers is __.
Your payoff from Part 2 is __ tokens

In Part 3, round __ and __ are selected to compute the payoffs.
Your payoff from Part 3 is __ tokens.

Your total payoff is __ tokens.

The exchange rate is $1 = 50 tokens.

The show up fee is $5.

So your earning from this experiment is $__.

Please remain seated and you will be asked to complete a survey.

Appendix B. Post-Experiment Survey

(*summary statistics in italics in parenthesis*)

Please answer the following survey questions. Your answers will be used for this study only. Individual data will not be exposed.

1. What is your age? _______________ (*Mean 20.5, Std Dev 2.5, Median 20, Min 17, Max 32*)
2. What is your gender?
   (a) Female (*58.2%*)
   (b) Male (*41.8%*)
3. How many siblings do you have? _______________ (*0 siblings 7.6%, 1-2 73.8%, 3 or more 18.6%*)
4. What is your major at the University of Michigan? _______________
5. Are you an undergraduate or graduate student?
   (a) Undergraduate student (*89%*)
   (b) Graduate student (*11.0%*)
6. Which year are you in your program? (*Mean 2.4, Std Dev 1.3, Median 2, Min 0, Max 5*)
7. Have you ever participated in any economics or psychology experimental studies before?
   (a) Yes. (*67.1%*) Please specify the number of times _______________ (*Mean: 5.6, Std Dev 5.9, Median 4, Min 1, Max 50*)
   (b) No. (*32.9%*)
8. What do you consider your racial or ethnic background to be?
   (a) White (*46.4%*)
   (b) Black (*15.2%*)
   (c) Hispanic (*2.5%*)
   (d) Asian (*29.5%*)
   (e) Other, please specify _______________ (*6.3%*)
9. In the past twelve months, have you donated money to or done volunteer work for charities or other nonprofit organizations?
   (a) Yes. (*74.3%*) Please specify the amount $_____ (*Mean 276.7, Std Dev 1357.2, Median 50, Min 0, Max 13,000.*) or the number of hours _____ (*Mean 57.4 hours, Std Dev 83.8, Median 30, Min 0, Max 500.*)
   (b) No. (*25.7%*)
10. You were assigned to the _______________ group during the experiment.

(a) Klee (*40.5%*)
(b) Kandinsky (*59.5%*)

11. On a scale from 1 to 10, please rate how much you think communicating with your group members helped solve the two extra painting questions. (*Mean 6.24, Std Dev 2.9, Median 7, Min 1, Max 10*)

12. On a scale from 1 to 10, please rate how closely attached you felt to your own group throughout the experiment. (*Mean 4.1, Std Dev 2.8, Median 3, Min 1, Max 10*)

13. In Part 2 when you were asked to allocate money between two other participants, how would you describe the strategies you used?

    (a) Try to allocate money equally between them. (*38.4%*)
    (b) Try to allocate more money to the one who was from your own group. (*45.2%*)
    (c) Try to allocate more money to the one who was from the other group. (*1.3%*)
    (d) Randomly (*9.7%*)
    (e) Other. (*5.5%*) Please specify _______________

14. In Part 3 when you were asked to decide on payoffs received by your match and yourself, how would you describe the strategies you used? Please select all that apply.

    (a) Try to earn as much money as possible for myself. (*50.6%*)
    (b) Try to earn as much money as possible for me and my match. (*50.6%*)
    (c) Try to earn more money than my match. (*5.5%*)
    (d) Reward those who were nice to me and punish those who were nasty to me. (*7.6%*)
    (e) Other. (*8.9%*) Please specify _______________

15. In Part 3 when you were asked to decide on payoffs received by your match and yourself, did it affect your decision in any way which group your match came from?

    (a) Yes (Go to Question 16) (*32.9%*)
    (b) No (Go to Question 17) (*67.1%*)

16. Please tell us how your match's group membership affected your decision. Compared with having a match from the other group, if I was matched with someone from my own group:

    (a) I was more likely to choose equal payoff. (*38.1%*)
    (b) I was more likely to be nice to my match when she was nice to me. (*10.5%*)
    (c) I was more likely to punish my match if she was not nice to me. (*1.9%*)
    (d) I was more likely to choose actions that increase our total payoff. (*38.1%*)
    (e) I was more likely to help him/her at my own expense. (*2.9%*)
    (f) Other. (*8.6%*) Please specify _______________.

17. On a scale from 1 to 10, please rate how familiar you were with the paintings made by Klee and Kandinsky, respectively, before this experiment. (*Klee: Mean 1.4, Std Dev 1.4, Median 1, Min 1, Max 10. Kandinsky: Mean 1.7, Std Dev 1.9, Median 1, Min 1, Max 10*)

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			Ingroup				Outgroup				Control			
Two-person dictator games														
		B chooses			Left	Right			Left	Right			Left	Right
Dict 1		(400,400) vs. (750,400)			0.28	0.73			0.4	0.6			0.33	0.67
Dict 2		(400,400) vs. (750,375)			0.63	0.37			0.63	0.37			0.82	0.18
Dict 3		(300,600) vs. (700,500)			0.67	0.33			0.92	0.08			0.76	0.24
Dict 4		(200,700) vs. (600,600)			0.33	0.68			0.65	0.35			0.5	0.5
Dict 5		(0,800) vs. (400,400)			0.59	0.41			0.77	0.23			0.64	0.36
Two-person response games: Bs payoffs identical														
	A stays out	If A enters, B chooses	Out	Enter	Left	Right	Out	Enter	Left	Right	Out	Enter	Left	Right
Resp 1a	(750,0)	(400,400) vs. (750,400)	0.46	0.54	0.35	0.65	0.67	0.33	0.55	0.45	0.29	0.71	0.32	0.68
Resp 1b	(550,550)	(400,400) vs. (750,400)	0.7	0.3	0.45	0.55	0.83	0.18	0.55	0.45	0.7	0.3	0.39	0.61
Resp 6	(100, 1000)	(75,125) vs. (125,125)	0.3	0.7	0.2	0.8	0.28	0.73	0.4	0.6	0.3	0.7	0.35	0.65
Resp 7	(450,900)	(200,400) vs. (400,400)	0.95	0.05	0.1	0.9	0.88	0.13	0.3	0.7	0.83	0.17	0.13	0.87
Two-person response games: Bs sacrifice helps A														
	A stays out	If A enters, B chooses	Out	Enter	Left	Right	Out	Enter	Left	Right	Out	Enter	Left	Right
Resp 2a	(750,0)	(400,400) vs. (750,375)	0.28	0.72	0.72	0.28	0.62	0.38	0.85	0.15	0.59	0.41	0.73	0.27
Resp 2b	(550,550)	(400,400) vs. (750,375)	0.8	0.2	0.72	0.28	0.83	0.18	0.82	0.18	0.95	0.05	0.64	0.36
Resp 3	(750,100)	(300,600) vs. (700,500)	0.68	0.33	0.42	0.58	0.83	0.18	0.71	0.29	0.82	0.18	0.55	0.45
Resp 4	(700,200)	(200,700) vs. (600,600)	0.49	0.51	0.26	0.74	0.85	0.15	0.54	0.46	0.55	0.45	0.23	0.77
Resp 5a	(800,0)	(0,800) vs. (400,400)	0.78	0.23	0.38	0.62	0.9	0.1	0.56	0.44	0.81	0.19	0.45	0.55
Resp 5b	(0,800)	(0,800) vs. (400,400)	0	1	0.5	0.5	0	1	0.7	0.3	0	1	0.64	0.36
Resp 8	(725,0)	(400,400) vs. (750,375)	0.65	0.35	0.7	0.3	0.8	0.2	0.78	0.23	0.74	0.26	0.83	0.17
Resp 9	(450,0)	(350,450) vs. (450,350)	0.63	0.38	0.68	0.33	0.83	0.18	0.75	0.25	0.74	0.26	0.87	0.13
Two-person response games Bs sacrifice hurts A														
	A stays out	If A enters, B chooses	Out	Enter	Left	Right	Out	Enter	Left	Right	Out	Enter	Left	Right
Resp 10	(375, 1000)	(400,400) vs. (350,350)	0.43	0.58	0.97	0.03	0.23	0.78	0.95	0.05	0.38	0.62	0.95	0.05
Resp 11	(400, 1200)	(400,200) vs. (0,0)	0.79	0.21	0.97	0.03	0.64	0.36	0.9	0.1	0.82	0.18	0.91	0.09
Resp 12	(375, 1000)	(400,400) vs. (250,350)	0.5	0.5	0.9	0.1	0.4	0.6	0.78	0.23	0.22	0.78	0.96	0.04
Resp 13a	(750,750)	(800,200) vs. (0,0)	0.88	0.13	0.98	0.03	0.78	0.23	0.88	0.13	0.83	0.17	0.91	0.09
Resp 13b	(750,750)	(800,200) vs. (0,50)	0.83	0.18	0.93	0.08	0.73	0.28	0.8	0.2	0.74	0.26	0.83	0.17
Resp 13c	(750,750)	(800,200) vs. (0,100)	0.85	0.15	0.88	0.13	0.8	0.2	0.7	0.3	0.78	0.22	0.78	0.22
Resp 13d	(750,750)	(800,200) vs. (0,150)	0.85	0.15	0.75	0.25	0.85	0.15	0.65	0.35	0.87	0.13	0.91	0.09

Table 1: Overview of Sequential Games with Self-Other Allocations

Session #	Treatment or Control	Game Set	# Subjects in Session	# Subjects in Analysis
1	Treatment	1	16	**15** (exclude #16)
3	Treatment	1	16	16
5	Treatment	1	16	16
7	Treatment	1	16	16
9	Treatment	1	16	16
2	Treatment	2	16	16
4	Treatment	2	16	**14** (exclude #1 and #10)
6	Treatment	2	16	16
8	Treatment	2	16	16
10	Treatment	2	16	16
17	Treatment	3	16	16
18	Treatment	3	16	16
19	Treatment	3	16	16
20	Treatment	3	16	16
21	Treatment	3	16	16
11	Control	1	14	**13** (exclude #3)
13	Control	1	16	16
15	Control	1	14	14
12	Control	2	16	16
14	Control	2	16	16
16	Control	2	12	12
22	Control	3	14	14
23	Control	3	16	16
24	Control	3	16	16

Notes:

1. Subjects #16 in Session 1, and #3 in Session 11 are excluded from analysis, as they participated in the pilo
2. Subjects # 1 and # 10 in Session 4 are excluded, as #1 participated in Session 2, and #4 in Session 1.
3. Game Set 1 includes Dict.1, Dict.3, Resp.1a, Resp.2b, Resp.5a, Resp.5b, Resp.8.
4. Game Set 2 includes Dict.2, Dict.4, Dict.5, Resp.2a, Resp.3, Resp.4, and Resp.11.
5. Game Set 3 includes Resp.1b, 6-9, 12, and 13a-d.

Table 2: Features of Experimental Sessions

Round	Total # Tokens	Average Allocation to Ingroup Match	Average Allocation to Outgroup Match	t-statistics for Paired Samples	Relative Difference
1	200	137.5	62.5	11.9	37.50%
2	250	173	77	13.1	38.40%
3	300	198.3	101.7	10	32.20%
4	350	239	111	11.8	36.57%
5	400	266.2	133.8	10.3	33.10%

Table 3: Average Token Allocations to Two Other Participants: Ingroup vs. Outgroup Match (one-tailed t-statistics for paired samples presented in the last column)

	Charity	Behindness Aversion	(BA)			
	ρ	σ				
Control	0.427	-0.049				
$(N = 536)$	(0.022)***	(0.025)**				
	Outgr Charity	Outgr BA	Ingr Charity	Ingr BA	Identity Parameters	
	ρ_o	σ_o	$\rho_o(1 + a)$	$\sigma_o(1 + b)$	a	b
Treatment	0.323	-0.112	0.474	-0.008	0.467	-0.931
$(N = 1896)$	(0.021)***	(0.019)***	(0.018)***	(0.021)	(0.112)***	(0.192)***

Notes:

1. The top panel reports estimates for the control sessions without identity, while the bottom panel reports estimates for treatment sessions with identity.
2. Robust standard errors in parentheses are adjusted for clustering at the individual level.
3. Significant at: * 10% level; ** 5% level; *** 1% level.

Table 4: Distributional Preferences: Regression Estimates for Player B Behavior

Dependent variables	Prob(B rewards A)		Prob(B punishes A)	
	Control	Treatment	Control	Treatment
	(1)	(2)	(3)	(4)
Benefit to B due to A's entry	0.601	0.342		
	(0.206)***	(0.186)*		
B's cost to reward A	-0.694	-0.306		
	(0.217)***	(0.183)*		
Benefit to A if B rewards	0.028	-0.089		
	(0.317)	(0.093)		
Ingroup match		0.502		-0.524
		(0.076)***		(0.090)***
Damage to B due to A's entry			-0.049	-0.048
			(0.046)	(0.028)*
B's cost to punish A			-0.553	-0.688
			(0.475)	(0.339)**
Damage to A if B punishes			-0.126	0.024
			(0.085)	(0.047)
Constant	-5.72	-3.057	1.423	0.414
	(1.331)***	(1.611)*	(0.533)***	(0.306)
Observations	156	550	236	828
Pseudo R2	0.211	0.115	0.217	0.241

Notes:
1. (1) and (2) include Resp 5a, Resp 1, Resp 2a, Resp 3, Resp 4, Resp 8 and Resp 9.
2. (3) and (4) include Resp 2b, Resp 8, Resp 9, Resp 1b, Resp 6, Resp 7, Resp 12, Resp 13a-d.
3. Session dummies and game dummies are included, but coefficients are omitted.
4. Robust standard errors in parentheses are adjusted for clustering at the individual level.
5. Significant at: * 10% level; ** 5% level; *** 1% level.

Table 5: Probit Regression: Determinants of Reciprocity

	Matching Conditions			Alternative Hypotheses and P-values		
	Ingroup	Outgroup	Control	Ingr > Outgr	Ingr > Contr	Contr > Outgr
Player A	0.629	0.509	0.57	0.000	0.029	0.029
	[676]	[676]	[381]			
Player B	0.68	0.529	0.638	0.000	0.066	0.000
	[790]	[790]	[447]			
Overall	0.656	0.52	0.606	0.000	0.008	0.000
	[1466]	[1466]	[828]			

Notes:
1. Games Dict 5, Resp 5a and 5b and Resp 9 are excluded, as all outcomes yield the same aggregate payoff.
2. Number of observations are in square brackets.

Table 6: Proportion of SWM Decisions and the Effects of Social Identity

	Matching Conditions			Alternative Hypotheses and P-values		
	Ingroup	Outgroup	Control	Ingr > Outgr	Ingr > Contr	Contr > Outgr
Player A	521.5	507.6	519.7	0.081	0.436	0.154
	[945]	[949]	[533]			
Player B	504.6	459.2	485.8	0.000	0.087	0.029
	[938]	[942]	[536]			
Overall	513.1	483.5	502.7	0.000	0.122	0.019
	[1883]	[1891]	[1069]			

Notes:

1. Expected earnings are in tokens.
2. Number of observations are in square brackets.

Table 7: The Effects of Social Identity on Expected Earnings

Dependent Variable :	Choosing SWM action (Probit)					
(Estimation Method)	(1)	(2)	(3)	(4)	(5)	(6)
Ingr match	0.391	0.401	0.321	0.409	0.421	0.295
	(0.073)***	(0.074)***	(0.079)***	(0.072)***	(0.072)***	(0.078)***
(Ingr match)*(# lines)	0.009			0.007		
	(0.007)			(0.007)		
(Ingr match)* (# words)		0.001			0.001	
		(0.001)			(0.001)	
(Ingr match)*			0.034			0.042
(self-reported attach.)			(0.018)*			(0.017)**
Age				0.007	0.006	0.004
				(0.021)	(0.021)	(0.021)
Male				0.261	0.262	0.273
				(0.088)***	(0.088)***	(0.089)***
Number of siblings				-0.023	-0.023	0.006
				(0.045)	(0.045)	(0.048)
Asian				-0.098	-0.095	-0.092
				(0.100)	(0.099)	(0.101)
Hispanic				-0.455	-0.456	-0.487
				(0.260)*	(0.259)*	(0.278)*
Black				-0.175	-0.176	-0.198
				(0.127)	(0.127)	(0.129)
Other race				-0.391	-0.391	-0.37
				(0.168)**	(0.169)**	(0.172)**
Role A	-0.523	-0.522	-0.54	-0.529	-0.528	-0.541
	(0.091)***	(0.091)***	(0.092)***	(0.092)***	(0.092)***	(0.093)***
Constant	-0.977	-0.977	-0.602	-1.129	-1.109	-1.127
	(0.244)***	(0.243)***	(0.239)**	(0.502)**	(0.501)**	(0.495)**
Observations	2932	2932	2912	2932	2932	2912
Pseudo R^2	0.227	0.227	0.232	0.239	0.239	0.243

Notes:

1. Standard errors in parentheses are adjusted for clustering at the individual level.
2. Significant at: * 10% level; ** 5% level; *** 1% level.

Table 8: Probit Analysis on the Effects of Group Attachment and Demographics on the Likelihood of Choosing SWM Actions

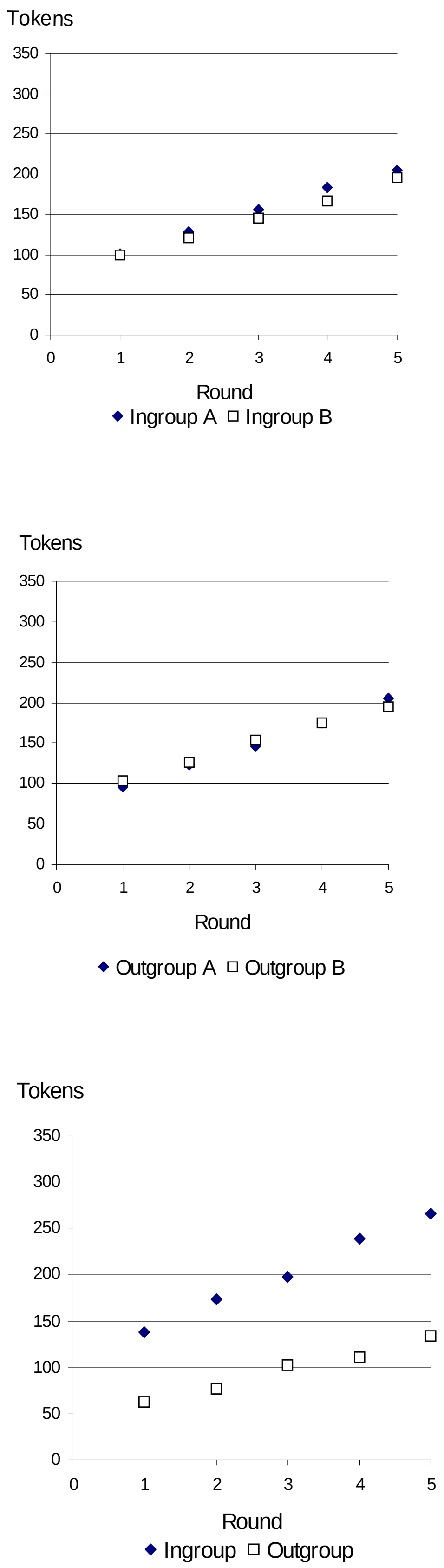

Figure 1: Other-Other Allocations Over All Treatment Sessions