GROUP-BIAS IN INTERPERSONAL INTERACTIONS

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January 2024

ABSTRACT

Groups, including those created based on trivial and meaningless criteria, exhibit group-bias; i.e. they favor their *in-group* relative to the *out-group*. What generates this bias has been a source of debate: Is it an effect of salience in categorization, or is what *appears* to be group-bias merely a consequence of strategic behavior to gain from the interdependance of payoffs in settings with groups? Using groups induced in the lab, I experimentally manipulate payoff structures to study what drives group-bias in interpersonal interactions. I find subjects favor their assigned in-group even when their respective in-groups *cannot* affect their payoffs. Categorization is hence a sufficient source of group-bias that operates even in the absence of any strategic pecuniary interests or expectations of generalized reciprocity. Additionally, I find subjects to attach importance to group labels more than just as a salient dimension of categorization, and care about how they're perceived by their in-group. Subjects are asked to nominate two out of a total of four group members for a bonus, and the nomination results are revealed only to treated groups. Subjects informed of being nominated by their in-group not only increase their allocations to the in-group but also decrease allocations to the out-group, thereby exhibiting more group-bias. This is consistent with subjects *identifying* with their assigned group and drawing non-pecuniary gains from the categorization. Those informed of their non-nomination decrease allocations to all and do not maintain any positive distinctness between their in-group and out-group, as if having disidentified from the group labels. (*JEL Codes:* C91, D91, Z13)

[1]Department of Economics, New York University. Guidance and support from Professor Guillaume Fréchette and Eric Spurlino, and the invaluable help and service of Shayne Trotman and Anwar A. Ruff is sincerely and gratefully acknowledged. I am also thankful for the comments and suggestions from Rachel Kranton, Andrew Schotter, Martin Rotemberg, Sam Kapon, and Matheus Silva. Financial support from the Center for Experimental Social Science and Professor Andrew Schotter is acknowledged. This study is approved by New York University Institutional Review Board (IRB-FY2016-1401).

1 INTRODUCTION

Groups are generally thought of as aggregates of people who either share some value or characteristic relevant to society, or have an interdependence of fate (Lewin, 1935). Previous experimental findings, however, report strangers categorized into groups based on minimal or trivial criteria (called 'minimal groups') also expressing group-bias by favoring their *in-group* relative to the *out-group* without being incentivised to do so. This suggests instead that perhaps categorization alone is sufficient to invoke entitativity and group-bias (Tajfel et al., 1971). Chen & Li (2009) find such group-bias among randomly assigned groups induced in the lab to persist across a wider class of cooperation and allocation games, including those involving self-interest. Compared to minimal groups, Goette et al. (2012) find group-bias to be more pronounced among randomly assigned real social groups (Swiss Army platoons), especially in their expectations of cooperation from their in-group members.

This paper investigates the *source* of this group-bias that can be so easily invoked, even among minimal groups lacking any social ties or history. Is it a categorization/labeling effect? If yes, is the significance accorded to these labels limited to only being a salient dimension of categorization; or important enough to prompt *group identification*? Or is what *appears* to be group-bias merely a consequence of strategies used to gain from interdependance of payoffs in settings with groups?

The first hypothesis is that group-bias comes from categorization or labeling. Either the reference to group labels simply makes the categorization salient, or maybe individuals attach inherent importance to these group divisions. In support of the latter, the social identity theory in social psychology suggests that categorization makes individuals develop a sense of belonging to their assigned in-group i.e. they develop *group identity*. Tajfel & Turner (1979) claim that the tendency to treat in-group members favorably, even so in the absence of "any rational link to economic self-interest," originates from this *identification* with one's in-group. Tajfel & Turner (1986) describe a rich psychological disposition that renders people to universally seek positive evaluations of their *identity* based on their own personal attributes as well as the attributes of the social groups that they are associated with. This is said to motivate people to favor their in-group in-order to establish positive distinctiveness of their group relative to others. This concept of identity, introduced in economic scholarship by Akerlof & Kranton (2000), is widely applied to contexts including but not limited to labor market discrimination, female labor force participation, political economy, norm formation, and group conflict (See, for example, Bénabou & Tirole (2011); Carvalho (2013); Eckel & Grossman (2005); Shayo (2020)).

An alternate hypothesis is that what may *appear* as group-bias is only a consequence of how people strategize to earn pecuniary payoffs in settings with groups. Rabbie et al. (1989) and Yamagishi & Kiyonari (2000) suggest in-group favoritism among minimal groups is likely motivated simply by an expectation of generalised reciprocity, wherein people favor their in-group, in expectation that others from their group would also do the same.[2] It is important to note here that there is nothing that prevents individuals to expect generalized reciprocity

[2]In the case of social groups, this may involve individuals *leveraging* group labels to appropriate economic or status gains (See, for example, Iyer & Shrivastava (2018); Mitra & Ray (2014); Dube & Vargas (2013)).

from the out-group as well, however it's reasonable for one to have higher expectations of reciprocity from their in-group based on perceived familiarity or shared labels. Brewer (1999) describes such in-group favor to be an outcome of some sort of contingent altruism that balances the benefits of cooperative interdependence against the risk of non-reciprocation. Such a response is considered to only be strategic and self-serving. In Yamagishi & Kiyonari (2000), for example, players cooperate more with an in-group player than an out-group player in the simultaneous version of a modified prisoner's dilemma game. In the sequential version, where players expect to benefit from direct reciprocity, they cooperate with both their in-group and out-group without any group-bias.

The contest between categorization/labeling versus the expectation of generalized reciprocity—as to which of these is the source of observed group-bias—is unresolved (Charness & Chen, 2020). In this paper, I experimentally manipulate payoff structures to study which of these two mechanisms is relevant. If the group-bias originated from expectations of generalized reciprocity, subjects wouldn't exhibit group-bias if their in-group couldn't affect their payoffs at all. A related work by Chen & Li (2009) examines the effect of two experiment design elements that could potentially induce expectations of generalized reciprocity within one's in-group: online chat, and other-other allocations.[3] In contrast to their approach, this paper tests if expectation of generalized reciprocity is necessary at all to generate group-bias, regardless of what induces such expectations. That is, does group-bias persist even when there is no interdependence of interests, and one's in-group cannot affect one's payoffs?

I find that subjects exhibit group-bias even when there is no scope for generalized reciprocity. Categorization/labeling is therefore a significant source of group-bias. To further investigate if subjects react to group labels simply as a salient dimension of categorization or if they begin to *identify* with the group labels, I test if subjects indeed "seek positive utility gains from categorization" as identity theory suggests (Akerlof & Kranton, 2000; Tajfel & Turner, 1986). Consistent with group identity, subjects care about how their in-group perceives them, and it reflects in their behavior towards the in-group relative to the out-group.

The paper tests these claims in the context of minimal groups induced in the lab. Studying behavior of minimal groups offers a useful opportunity to understand social behavior in a controlled setting without importing unobserved group dynamics, history, stereotypes, or any membership bias. Minimal groups are commonly used to understand social identity, cooperative behavior, conflict, and discrimination (See, for example, Eckel & Grossman 2005; Chen & Li 2009; McLeish & Oxoby 2007; Kranton et al. 2020). Comparisons of behavior among minimal groups with those of real social groups typically reveal congruent reactions, differing, if at all, only in reaction size.[4]

In-group favor and out-group disfavor is inferred based on the size of allocations subjects offer to other randomly matched subjects from either groups in a series of allocation games, as is common in the literature. The experiment design consciously uses dictator games instead of

[3] Other-other allocations refer to when subjects are made to allocate resources between two other subjects with no self-interest.

[4] Goette et al. (2012) find randomly created social groups to differ from minimal groups in how they punish defections against other in-group members, possibly due to stronger empathy among members of natural social groups.

other strategic cooperation or public goods games to avoid potential gains via cooperation or other super-ordinate goals from confounding group-bias.

Subjects play the allocation games over different rounds with new matches in every round. In any given round, the subject not only acts as a divider (or dictator) between themselves and their match, but is also simultaneously a passive receiver (or recipient) to another subject who sees them as their match in the same round. If the round is selected for payment, the subject has a fifty percent chance of either pocketing the share they allocated to themselves as the divider, or earning the share allocated to them by another subject to whom they were matched as the receiver. Since subjects' payoffs are determined based on both own and others' allocation decisions, this generates an interdependence of interests.

To test if group labels matter only as a means to strategically serve pecuniary interests, subjects are made to play allocation games under two settings—one with an interdependence of payoffs, and another without. In the first setting, subjects are matched randomly with anyone from either their in-group or out-group, while also simultaneously in the same round being matched as a recipient to another subject who could either be a member of their in-group or out-group. In the other setting, subjects are matched randomly with anyone from either their in-group or out-group, but are matched as a recipient in the same round *only to a subject from a group different from their own match's group*. That is, if a subject acts as divider to someone from their in-group, in the same round they would only be matched as a recipient to someone from their out-group; and vice-versa. With only select rounds randomly chosen for payment, the latter setting eliminates any scope for expectations of generalized reciprocity.

Group-bias, if stemming from categorization/labeling, should be similar under both these settings of allocation games. Instead, if it is only an outcome of an expectation of generalized reciprocity, we should not observe group-bias in the latter setting where subjects are matched as dividers and receivers to members from strictly separate groups.

To further test if group labels matter to individuals more than just a salient dimension of categorization, I experimentally induce a change in what is theorized to motivate group identification—non-pecuniary utility gains from group attachment (Akerlof & Kranton, 2000; Tajfel & Turner, 1986). I test whether information on how one's in-group evaluates them (affecting said utility gains from group identification) changes the tendency to favor the in-group and disfavor the out-group. I ask subjects to nominate two out of a total of four members of their group for an earnings bonus. Groups make these nominations on the basis of how they think each member contributed to the group's earnings in the preceding joint-effort task. Subjects in the treatment arm are informed whether they were nominated by their in-group or not, while subjects from the control arm aren't given any information about their nomination until after the session concludes.

If group-bias were a consequence of participants *identifying* with their assigned group and drawing positive utility gains from the association, a poor evaluation of self from one's in-group would constitute an *acceptance threat* generating a loss in any such group-derived identity. This should deplete one's group identification and possibility result in disidentification for low identifiers, revealed by an identical treatment of one's in-group and out-group

(refer to Branscombe et al. (1999) for more details on threats to identity).[5] Likewise, subjects who receive a positive evaluation would alternately secure higher identity gains by increasing in-group favor and out-group derogation.

Group-bias motivated simply by an expectation of generalized reciprocity in determining each others' payoffs wouldn't generate such rich behavioral reactions to *within-group* evaluations. Negative evaluation from the in-group might decrease expectations of reciprocity and therefore reduce in-group favor, but a positive evaluation would not encourage decreasing allocations to the out-group.

I find group-bias to respond to within-group nominations in line with predictions from group identity theory. Subjects informed of their nomination increase their allocations to the in-group and decrease allocations to the out-group. Those informed of their non-nomination decrease allocations to all and do not maintain any positive distinctness between their in-group and out-group, as if they have disidentified from the group labels. Additionally, this reaction to within-group evaluations is similar under the two settings with and without interdependence of payoffs.

These findings advance our understanding of what generates group-bias. Group-bias stems from categorization/labelling, and persists even in the absence of any pecuniary gains or expectations of generalized reciprocity. Consistent with group identity, individuals respond to group divisions only as long as they receive positive non-pecuniary gains from associating with their in-group.

2 EXPERIMENT DESIGN

Stage Zero: Organization

In each session, 14-16 subjects are organized randomly into four groups: Group A^C, Group B^C, Group A^{IR} and Group B^{OE}.[6] Superscripts denote treatment assignments, where groups A^C and B^C are control groups and groups A^{IR} and B^{OE} are treated with in-group reputation (IR) and out-group envy (OE) interventions respectively. Under the in-group reputation (IR) intervention, subjects are informed of whether their group nominated them to receive the earnings bonus or not. The out-group envy (OE) intervention, where subjects are informed of whether their out-group is presented with an additional opportunity to earn money, is found to fail in generating any difference in behavior, and its analysis is relegated to Appendix A.

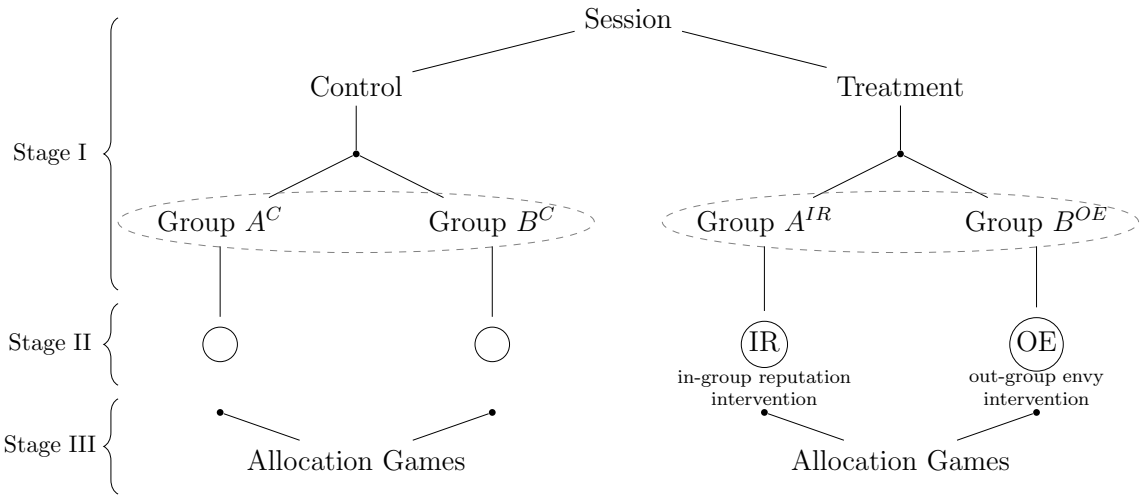
To hide treatment status from participants, participants are only informed of being assigned to either 'Group A' or 'Group B.' All interactions—within and between groups—are limited to those within the same treatment status; i.e. groups A^C and B^C are out-groups to each other, and A^{IR} and B^{OE} are out-groups to each other.

[5] The predicted behavior would be different in another setting where actions are observable by others and the setting is dynamic. Facing an acceptance threat in such a setting may inspire exhibition of prototypical attributes of the group to gain acceptance in the future.

[6] Chen & Li (2009) show that the group assignment technology used (random assignment versus categorization based on true painting preferences) has no significant effect on subject behavior, and hence recommend random assignment whenever possible.

The entire session takes place via computer terminals in the laboratory. Figure 1 summarizes the experimental design.

FIGURE 1 :
Experiment Design



Stage I: Introduction

After being organized into groups, subjects are assigned unique names based on popular cities of the world to use as their code-names during the session.[7] Each subject's code-name begins with the letter of the group (A or B) they are assigned to. All interactions between subjects are strictly anonymous and use only the code-name. Subjects are also explicitly asked to note that group membership can easily be inferred based on assigned code-names.

Quiz to encourage group attachment (Part I-Task I):

Each group separately plays a quiz comprising 8 rounds of logical reasoning questions with multiple choice. In each round, one member from each group is chosen at random to submit the group's answer for that round. The identity of the group member chosen to submit the answer for the group is hidden from the rest of the group, unless the member chooses to disclose it herself via chat. The groups are allowed to discuss the answer within their own group using a chat window (with messages tagged to the respective code-name of the sender). For every correct answer submitted by the group, all members are awarded 2 Experimental Currency Units (ECUs) each.

This collective problem-solving task using a within-group chat is purposed to encourage interactions within each group and to promote identification.

Stage II: Intervention

After 8 rounds of the group quiz, Group B subjects (B^C and B^{OE}) are asked to wait for the next part of the experiment. The messaging of this instruction to wait that the two

[7] Instructions are available in Appendix B.

groups receive are different and the difference constitutes the *out-group envy intervention (OE)*. While Group B^C is simply asked to wait until Part II of the session begins, Group B^{OE} are asked to wait because members of their out-group A are playing a bonus task for additional money and unavailable to begin Part II (See Instructions in Appendix B for exact messaging). Out-group envy intervention (OE) fails to affect subjects' allocations (Table A2) and the quality of their connections with either group (Figure A3); its analysis is therefore relegated to Appendix A. OE intervention fails likely because most Group B^{OE} members think that their out-group was invited to play an additional task only by random chance (Figure A2), and therefore make no comparisons between themselves and the out-group on this basis of them getting selected for an additional task.

Meanwhile, Groups A^{IR} and A^C are asked to nominate two members of their own group (other than themselves) who would receive a bonus of 4 ECUs. Subjects are informed that the bonus is awarded based on who receives the most nominations, and that each nomination is private and not shared with any other participant. Ties, if any, are broken randomly. No criteria is specified based on which the nominations are to be made, but the chat history from the group quiz is made available to look at on the disabled group-chat window. 93.75% of the Group A participants respond to the question "What do you think was the criterion others used to make their nominations?", in a survey at the end of session, with a choice of "Based on contributions during Group Quiz in Task I"; against two other options: "Random Choice" and "Based on reasons unrelated to Task I".

After all nominations are received, two members from each Group As are identified to be in the 'Top 2.' Only members of Group A^{IR}—the treated Group A—are informed of whether they are in the 'Top 2' or not. Group A^C receives no information about the results of the nomination procedure until the end of the sessions. Payouts are disclosed only at the end of the experiment, and so there is no way for members of A^C to know their aggregated within-group rank until after the experiment ends. The intervention is referred to as the 'in-group reputation' intervention because we expect subjects to interpret being in the 'Top 2' as being well-regarded in the group for their contributions in the group quiz and thus deserving the bonus. Since the nomination to the 'Top 2' is selective and endogenous, the appropriate control groups for Group A^{IR} members in the 'Top 2' and Group A^{IR} members not in the 'Top 2', are Group A^C members in the 'Top 2' and Group A^c members not in the 'Top 2' respectively. The between-subjects' design ensures that results are not confounded by experimenter demand effect.

Stage III: Allocation

After all subjects proceed to the final stage of the session (Part II), each subject is made to play 8 rounds of modified dictator games. Subjects are informed that Part II (and the session) ends after the 8 rounds.

In each round, subjects are matched (with another subject from the in-group or the out-group, but within the same treatment status) and asked to divide a sum of money between themselves and their match. Subject are informed that as "dividers" of the pair, they are anonymous to their match (the "receiver"). Since all participants are assigned a match,

each subject simultaneously also serves as "receiver" to another subject in the same round. Subjects make no decisions as the "receiver" and are not informed of who their "divider" is. In every round, new matches are made. No feedback is provided between rounds.

Subjects are informed that 2 out of the total 8 rounds will be randomly chosen for payouts. For any round selected for payout, the subject's earning from that round is based on *either*,

- the division of the monetary sum determined by them as a "divider", *or*
- the division of the monetary sum determined by another subject to whom they were the "receiver,"

with a 50-50 chance.

Based on this general setup, subjects play allocation games under the following settings across the 8 rounds:

Rounds 1-4 **General Setting:**
In Rounds 1-4, each subject is matched with one other subject and asked to allocate 10 ECUs between themselves and their match (code-name of the match is displayed on the screen).

Subjects are informed that matching in Rounds 1-4 is such that in each round, they would be a "divider" to their match (who could be from their own group or the out-group) and a "receiver" to another subject (who could also be from their own group or the out-group).

Rounds 5-6 **Competitive Allocation Setting:**
In Rounds 5-6, each subject is matched with two other subjects and asked to allocate 20 ECUs between themselves and their matches (code-names of the two matches are displayed on the screen).

Subjects are informed that matching in Rounds 5-6 is such that in each round, they would be a "divider" to their two matches (who could either both be from Group A, or both from Group B, or one from each) and a "receiver" to another subject (who could also be from their own group or the out-group).

Rounds 7-8 **No-Generalized-Reciprocity Setting:**
In Rounds 7-8, each subject is again matched with one other subject and asked to allocate 10 ECUs between themselves and their match (code-name of the match is displayed on the screen).

Subjects are informed that matching in Rounds 7-8 is such that in each round if they are a "divider" to someone from their in-group, then in that round they would be a "receiver" to someone from the out-group. Likewise, if they are a "divider" to someone from the out-group, then in that round they would be a "receiver" to someone from the in-group.

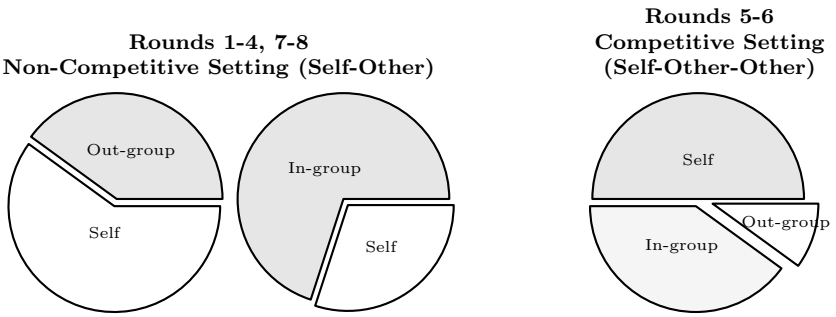
Note: Design and choice of dictator games

In-group favor and out-group derogation is typically inferred in the literature on the basis of how subjects allocate money between two other subjects belonging to either groups (with or without personal interest). The experiment design recreates this setting in Rounds 5 and 6 of the modified dictator games.

The paper however majorly relies on allocations made in Rounds 1-4 and Rounds 7-8 to infer in-group favor and out-group derogation; see Figure 2. This is because on the basis of allocations made out to two subjects from the same sum of money, it is hard to determine whether an in-group member was allocated more money because of in-group favor (and hence at the expense of the out-group member's share) or because the out-group member was discriminated against (to the benefit of in-group member's share), or a combination of the two. Allocations from settings where the subject has to make allocations to out-group and in-group matches from *separate* pots or sums of money, as in Rounds 1-4 and Rounds 7-8, allows the inference of in-group favor separately from discrimination against the out-group, and vice-versa.

Strategic cooperation or public-goods games are avoided to disallow super-ordinate gains from co-ordination to confounding group-bias.

FIGURE 2 :
Modified dictator games: non-competitive vs competitive



Since rounds are randomly chosen for payout, the matching in Rounds 7-8 ensures that the group that the subjects' matched "receiver" for the round belongs to cannot affect the subjects' payoffs from that round. This constitutes the no-generalized-recriprocity setting. The matching settings for different rounds are only disclosed before the specific rounds and are hence unanticipated by the subjects.

Comparison of allocations are only made between Groups 'A' (in control and treatment), and between Groups 'B' (in control and treatment); controlling for any experimenter demand. After 8 rounds of this stage, the session concludes. Subjects then fill out a short survey (available in Appendix B) following which they are shown a summary of their earnings.

Payments

All subjects receive 10 USD as a participation reward. Any Experimental Currency Units (ECUs) earned during the session are then converted to US Dollars at a rate of 0.4 USD per ECU and added to the participation reward for the final payment. The total earnings per subject averaged between $20 - 25$ US Dollars for an average of 60 minutes of their time.

3 RESULTS

122 undergraduate students from New York University participated in the experiment across 8 sessions. The allocation decisions of the participants, their nomination status, their responses to the survey at the end of the session, and the transcripts of the group chat constitute the data used for analysis.

Subjects (assigned to control) allocate, on an average, roughly 20-25% of the total ECUs available to them in each round to their match(es). The distribution of ECUs allocated to match(es) is left skewed with roughly 40% of the subjects allocating nothing to their match(es), no matter the matches' group. This is consistent with typical behavior observed in dictator games (Engel, 2011).

RESULT 1: (Confirmation of previous findings in the literature)
Minimal groups exhibit group-bias.

As shown previously in the literature, the size of allocation made to matches varies with the group assignment of the match. In the competitive allocation setting of Rounds 5-6, if the two matches are from different groups, subjects split roughly 65-35 in favor of the in-group match. The difference in the mean allocation made to matches from the in-group relative to the out-group is statistically significant (t-test, $p < 0.01$; Table A1). When matches are both in-group or both out-group, allocations are split equally after subjects keep roughly 75-80% of the ECUs to themselves. This division doesn't vary (in a statistically significant way, i.e. $p > 0.10$) depending on whether the two matches are from the in-group or out-group.

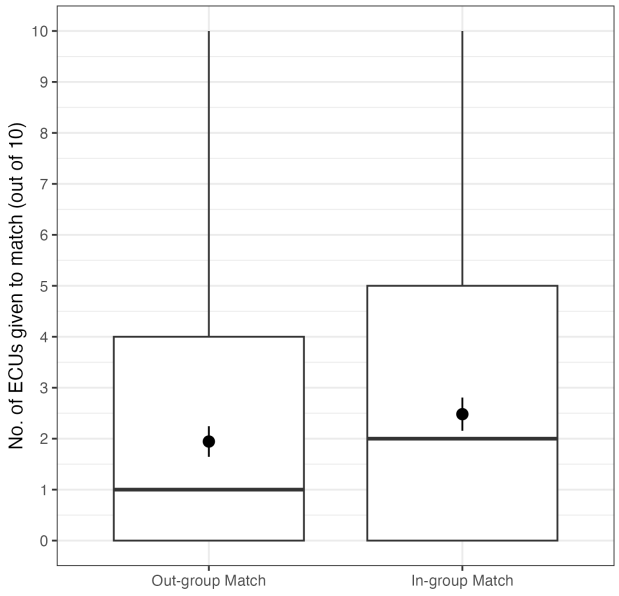
Even in Rounds 1-4, where subjects are effectively asked to make allocations individually and from separate sums of money, they maintain a positive difference between the in-group and out-group by allocating roughly 36% more ECUs in favor of the in-group (Table 1). Despite having to make the allocations individually and independently, a difference in mean allocations of 0.675 ECUs (t-test, $p < 0.01$) is maintained in favor of the in-group.

There is also heterogeneity in the size of allocations made by subjects. To reflect this heterogeneity, allocations are graphically summarized using box and whisker plots; see Figure 3. The box is drawn from the 25^{th} percentile to the 75^{th} percentile, with a horizontal line drawn inside to denote the median, and a marker to denote the mean (with standard error). The whiskers go from the lower quartile to the minimum and from the upper quartile to the maximum, unless the two respective values coincide.

TABLE 1 :
Allocations made by control groups A^C and B^C in Rounds 1-4.

	Dependent variable: ECUs allocated to the match	
	OLS	*Poisson*
Rounds 1-4	(1)	(2)
In-group match	0.675***	0.312***
	(0.189)	(0.093)
Constant	1.844***	0.612***
	(0.278)	(0.151)
Observations	236	236
Sample	A^C, B^C	A^C, B^C
Clustered SE	Participant	Participant
F Statistic	5.034** (df = 1; 234)	
Note:		*p<0.1; **p<0.05; ***p<0.01

FIGURE 3 :
Box-Whisker Plot: Control groups A^C, B^C (Rounds 1-4)

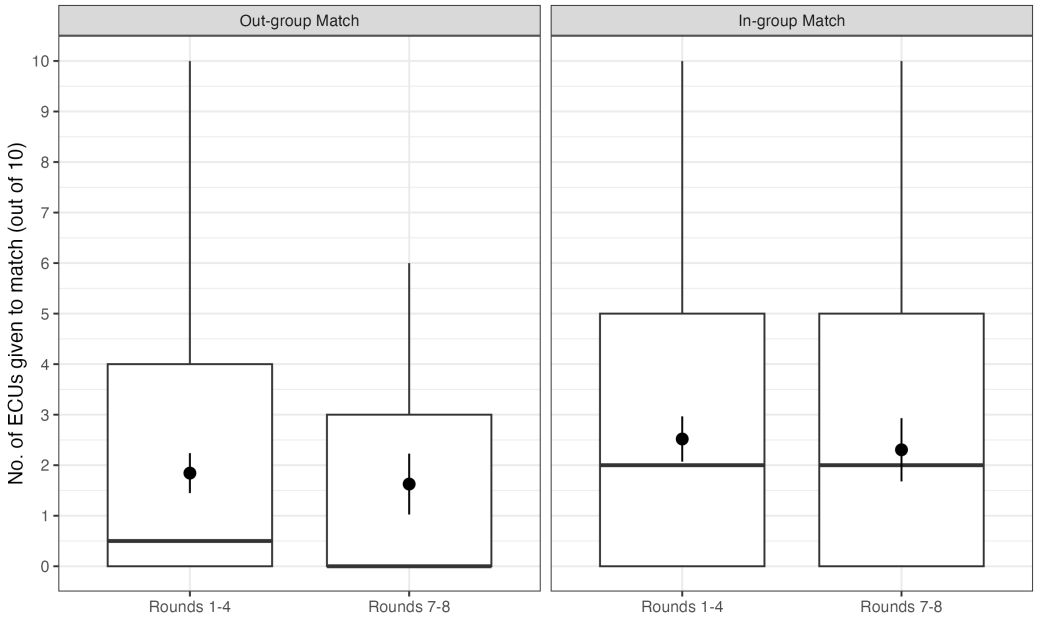


Notes: This figure shows the Box and Whisker Plot of the allocations made by the control groups A^C and B^C to their matches in Rounds 1-4. No. of observations = 236. The box is drawn from the 25^{th} percentile to the 75^{th} percentile, with a horizontal line drawn inside to denote the median, and a marker to denote the mean (with standard error). The whiskers go from the lower quartile to the minimum and from the upper quartile to the maximum, unless the two respective values coincide.

RESULT 2: Group-bias persists even when the scope for generalized reciprocity is eliminated.

There is no statistically significant difference between the size of allocations made (by the control group) under the general setting (Rounds 1-4) and the setting with no scope for generalized reciprocity (Rounds 7-8); see Figure 4 and Table 2. As in Rounds 1-4, in Rounds 7-8 as well, allocations made to an in-group match are larger. This suggests that group-bias does not stem exclusively from any expectations of generalized reciprocity. The categorization/label effects that drive group-bias in Rounds 1-4 (and in previous studies in this literature), persist even in the absence of any scope for pecuniary gains from group-contingent behavior.

FIGURE 4 :
Box-Whisker Plot: Control groups A^C, B^C (Rounds 1-4 vs 7-8)



Notes: This figure shows the Box and Whisker Plot of allocations made by control groups A^C and B^C to their matches in Rounds 1-4 (General Setting) vs Rounds 7-8 (No Generalized Reciprocity Setting). No. of observations = 236, 128; respectively.

Responses submitted in end-of-session questionnnaire to the question "In Part II, as a "divider", what about your match(es) influenced how many ECUs you gave to them?" reveal that most subjects thought it was always in their best interest to keep all allocations to themselves, and yet chose to allocate some ECUs to in-group members.

TABLE 2 :
Allocations made by control groups A^C and B^C in Rounds 1-4 vs 7-8

	Dependent variable: ECUs allocated to the match		
	Rounds 1-4	Rounds 7-8	Rounds 1-4,7-8
	(1)	(2)	(3)
In-group match	0.675***	0.678***	0.675***
	(0.190)	(0.219)	(0.190)
No-generalized-reciprocity setting			−0.217
			(0.141)
In-group match ×No-generalized-reciprocity setting			0.003
			(0.215)
Constant	1.844***	1.627***	1.844***
	(0.280)	(0.302)	(0.280)
Observations	236	118	354
Sample	A^C, B^C	A^C, B^C	A^C, B^C
Clustered SE	Participant	Participant	Participant
F Statistic	5.034**	2.441**	2.660**
Note:			*p<0.1; **p<0.05; ***p<0.01

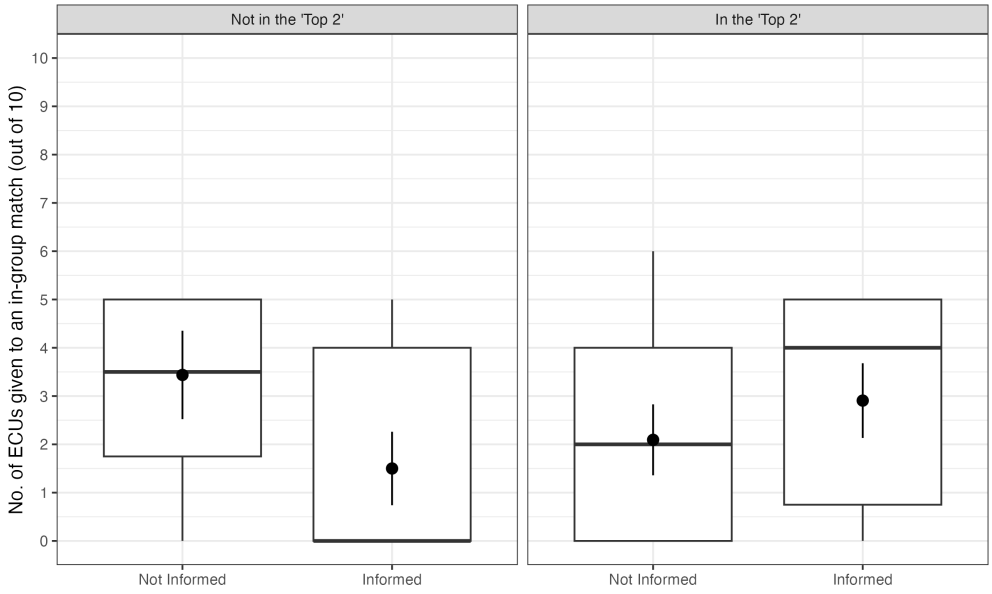
RESULT 3: Positive evaluation by the in-group enhances group-bias. Negative evaluation from one's in-group leads to no distinction in behavior towards the in-group and out-group, synonymous with disregarding the group categorization altogether i.e. disidentification.

Subjects informed of their nomination to the 'Top 2' allocate more generously to their in-group matches in Rounds 1-4 (Figure 5 (a); panel on the right). The mean difference in allocations to the in-group made by those informed and those not informed of their nomination is 2.750 ECUs (t-test, $p < 0.01$). Although there is no significant difference in the *mean* allocations made to the out-group, the distribution skews towards lower values and difference in the median allocation is significant (Figure 5 (b); panel on the right). This is synonymous with pronounced groupness among those informed of a positive evaluation from their in-group.

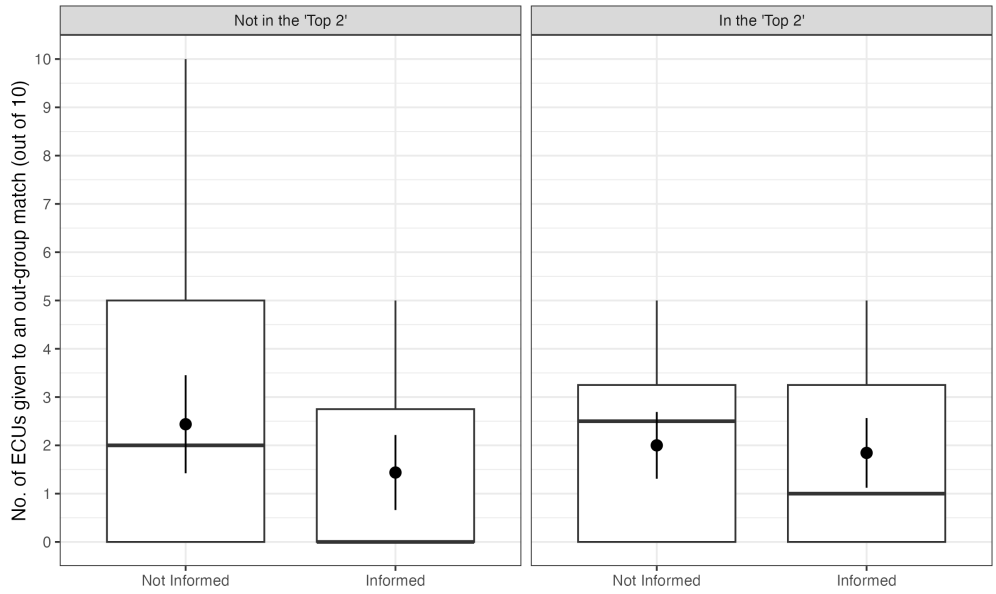
Subjects informed about *not* being nominated to the 'Top 2' lower their allocations to *both* their in-group and out-group matches (Figure 5 (a),(b); panels on the left). The median behavior of subjects informed of their non-nomination is to keep the entire sum for themselves. There is no longer any significant distinctiveness in the share offered to an in-group match versus an out-group match, as if the subjects have disidentified.

FIGURE 5 :
Box-Whisker plot: Group A's response to nomination × treatment (Rounds 1-4)

(A)
Allocations by Group A to their in-group



(B)
Allocations by Group A to their out-group



Notes: This figure shows the Box and Whisker plots of allocations made by Group A in Rounds 1-4 to members from the in-group (top) and the out-group (bottom), based on their nomination to the 'Top 2' and treatment (i.e. informed or not about the nomination). No. of observations = 256.

This reaction to within-group evaluations is consistent group identity theory, according to which subjects *identify* with their group-assignments and draw some non-pecuniary utility from this attachment. Upon learning that their in-group has nominated them for a bonus, their gains from the group divisions are boosted and they increase their group-bias in response. Alternately, if subjects learn that their in-group didn't nominate them, there is some disutility to being associated with a group that doesn't regard them well. In response, subjects disidentify from the group divisions and treat all matches in a similar way regardless of which group they belong to.

It is important to note that this finding is only *consistent* with group identification being the operating mechanism, but not an evidence for it.

If expectations of generalized reciprocity or the repayment of some moral debt after being nominated by one's in-group were the driving mechanism, nominated members would only feel obligated to increase their allocations to the in-group, and wouldn't necessarily reduce their allocations to the out-group. The experiment design allows subjects to be able to increase or decrease allocations to a match, without affecting their incentives for allocations to other matches. But we do see nominated subjects who are made aware of their nomination both increasing in-group allocation and reducing out-group allocation—synonymous with enhanced group-bias.

Additionally, subjects' responses to learning their nomination status from the in-group reputation treatment are similar under the general setting (Rounds 1-4) and the setting with no generalized reciprocity (Rounds 7-8); see Figure 6. This means that nominated subjects increase group-bias upon learning their nomination status even when they expect no pecuniary gains/losses from either groups.

In the survey taken at the end of the session, non-nominated subjects who are informed of their non-nomination describe their connection to their in-group to be weaker than those who aren't informed about their non-nomination (Figure A1). There are no notable effects of learning one's nomination status on the reported connection with the out-group (i.e. with Group B).

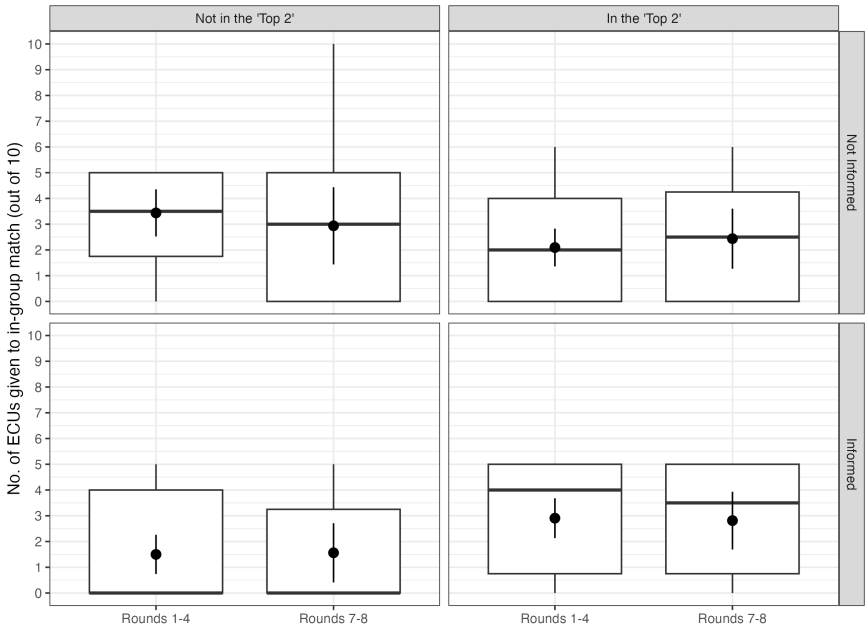
4 CONCLUSION AND DISCUSSION

Categorization is known to generate entitativity and group-bias among random groups induced in the lab (Chen & Li, 2009), as well as among randomly created real social groups (Goette et al., 2006); even in the absence any shared characteristics or inter-group history. The precise motive behind this behavior has been a source of debate (Charness & Chen, 2020; Yamagishi & Kiyonari, 2000).

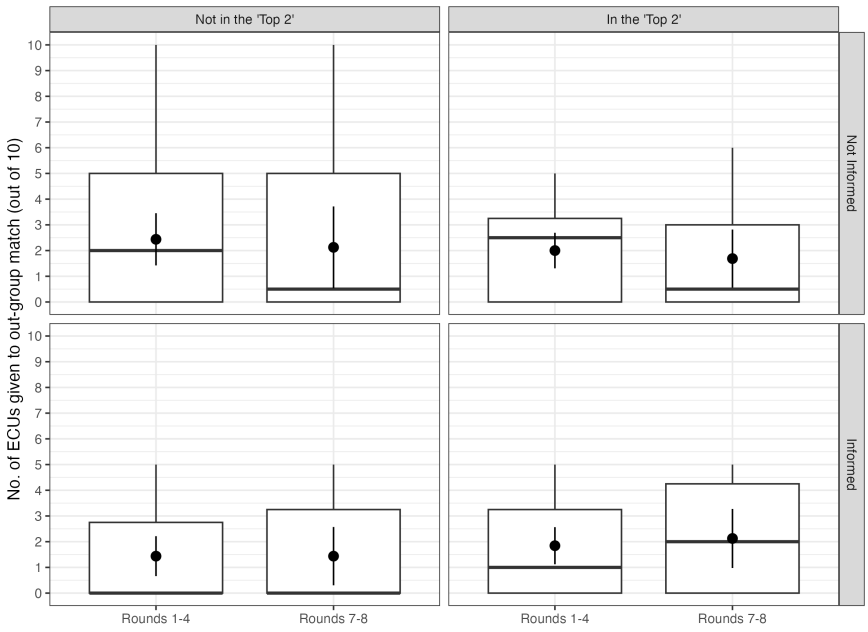
This paper studies if this group-bias is a consequence of categorization/labeling, or if it is driven solely by individuals strategically seeking pecuniary interests in group settings. The former suggests that people attach some meaning to group labels and therefore seek positive distinctness for their group relative to others. The latter attributes groupness simply to selective altruism in expectation of others from the group also behaving in the same way i.e. in expectations of generalized reciprocity (Rabbie et al., 1989; Yamagishi & Kiyonari, 2000).

FIGURE 6 :
Box-Whisker plot: Group A's response to nomination × treatment (Rounds 1-4 vs 7-8)

(C)



(D)



Notes: This figure shows the Box and Whisker plots of allocations made by Group A in Rounds 1-4 (General Setting) vs Rounds 7-8 (No Generalized Reciprocity Setting) to members from the in-group (top) and the out-group (bottom), based on their nomination to the 'Top 2' and their treatment (i.e. informed or not). No. of observations = 128.

Minimal groups, created randomly, are first made to play a joint-effort task. Group members are then asked to nominate two out of a total of four members for a bonus. Nomination status is revealed only to the treated subjects. The subjects then proceed to play several rounds of modified dictator games where in each round they are randomly matched to two other subjects as 'divider'(s) and 'recipient'(s) respectively, with no feedback. The games are played under distinct matching settings, that combined with the random selection of rounds for payout, eliminates the scope for generalized reciprocity in some rounds and not in others.

Consistent with previous findings in the literature, subjects are found to allocate more to members from the in-group than the out-group. Even in the absence of any 'competition' over payoffs between groups, categorization matters for distributive decisions. Interestingly, group-bias is also exhibited in rounds where scope for expectations of generalized reciprocity is eliminated. This is taken as evidence of categorization/labeling being a significant source of group-bias that persists even in the absence of any pecuniary gains from behaving so. Kranton et al. (2020) describe this tendency to react to group divisions to be an individual-specific trait that is potentially stable across contexts and settings.

Subjects' consideration for group labels when making distributive choices is also affected by how one's in-group evaluates them. This is taken as evidence of individuals' sensitivity to group labels responding to the non-pecuniary utility gains they draw from the group divisions. Subjects informed of being nominated by their in-group to receive a bonus increase their allocations to the in-group and decrease allocations to the out-group, synonymous with an exhibition of increased group-bias. Those informed of not being nominated decrease their allocations to *all* their matches in general and do not maintain any positive distinctness between their in-group and out-group, as if having disidentified. These reactions to nomination and non-nomination by one's own in-group are consistent with predicted reactions to an acceptance threat to group identity (Branscombe et al., 1999). While the findings do not preclude other mechanisms that could explain why group labels matter to individuals even in the absence of social ties or history, they confirm that group-bias is not exclusively driven by pecuniary interests or some strategic motive to gain from interdependence of payoffs in settings with groups.

These findings increase our understanding of the source of group-bias in interpersonal interactions, and lend support to the formalization of such behavior in economic models that explain norm formation, homophily in matching and referrals, and the widespread use and success of identity politics; among others.

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Tajfel, H., & Turner, J. (1986). The social identity theory of intergroup behavior. *In: Worchel, S. and Austin, W.G., Eds., Psychology of Intergroup Relation, Hall Publishers, Chicago*, 7-24.

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APPENDIX A

TABLE A1 :
Allocations made by control groups A^C and B^C (Rounds 5-6)

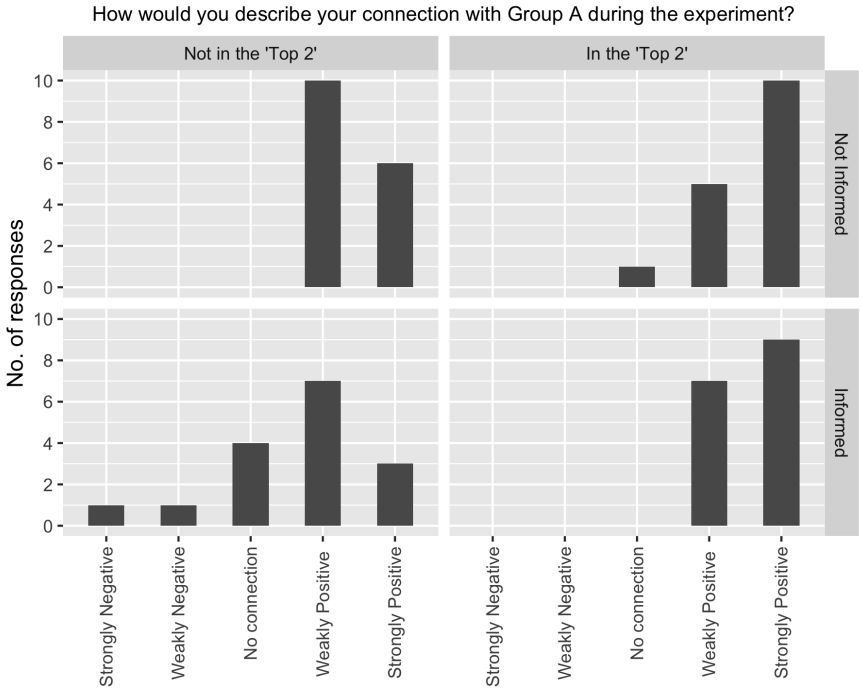
	Dependent variable: ECUs allocated to one match (say match 1) as a share of the total ECUs given to the two matches
Rounds 5-6	OLS
In-group match 1	0.140^{**}
	(0.056)
In-group match 2	-0.188^{***}
	(0.054)
In-group match 1 × In-group match 2	0.084
	(0.075)
Constant	0.509^{***}
	(0.029)
Observations	70
Sample	A^C, B^C
Clustered SE	Participant
F Statistic	12.242^{***} (df = 3; 66)
Note:	*p<0.1; **p<0.05; ***p<0.01

TABLE A2 :
Null Effect of OE: Allocations made by groups B^{OE} and B^{C}

	Dependent variable:ECUs allocated to the match	
	Rounds 1-4	Rounds 7-8
	(1)	(2)
In-group match	0.690^{**}	0.556^{*}
	(0.285)	(0.318)
Waiting 'for Group A' (OE Treatment)	-0.294	-0.359
	(0.455)	(0.455)
In-group match × Waiting 'for Group A' (OE Treatment)	0.103	0.201
	(0.375)	(0.403)
Constant	1.469^{***}	1.296^{***}
	(0.370)	(0.382)
Observations	236	118
Sample	B^{C}, B^{OE}	B^{C}, B^{OE}
Clustered SE	Participant	Participant
F Statistic	3.019^{**}	1.447
	(df = 3; 232)	(df = 3; 114)
Note:		*p<0.1; **p<0.05; ***p<0.01

FIGURE A1 :
Reported connection of members of Groups A by treatment

(A)
With their in-group



(B)
With the out-group

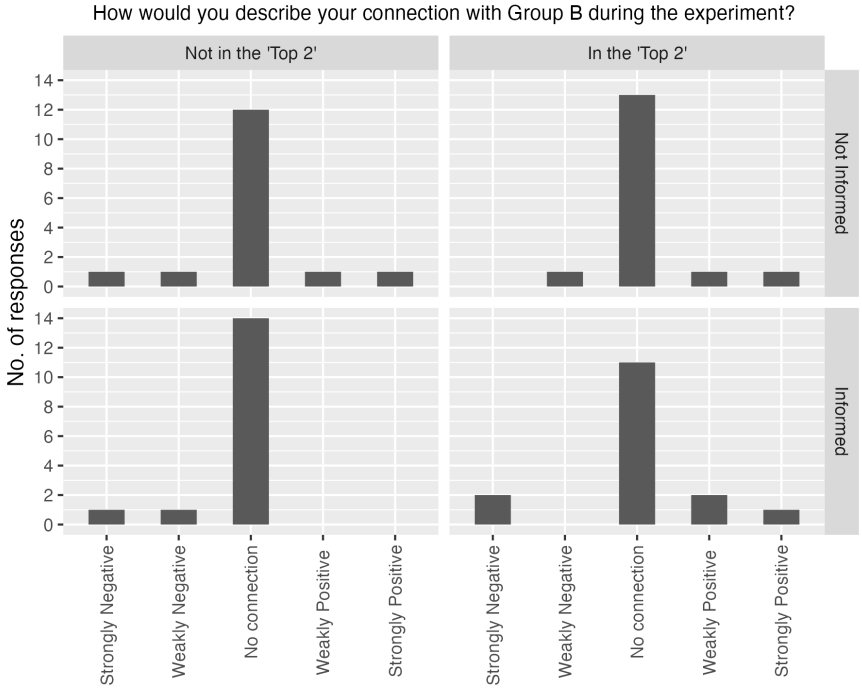


FIGURE A2 :
Group B's reaction to out-group envy treatment

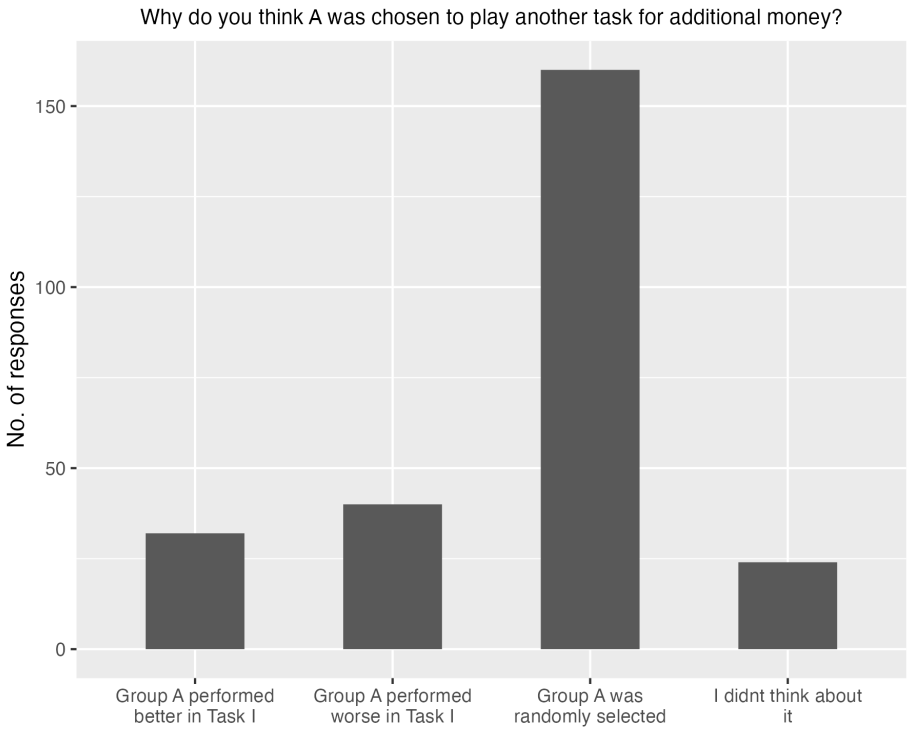
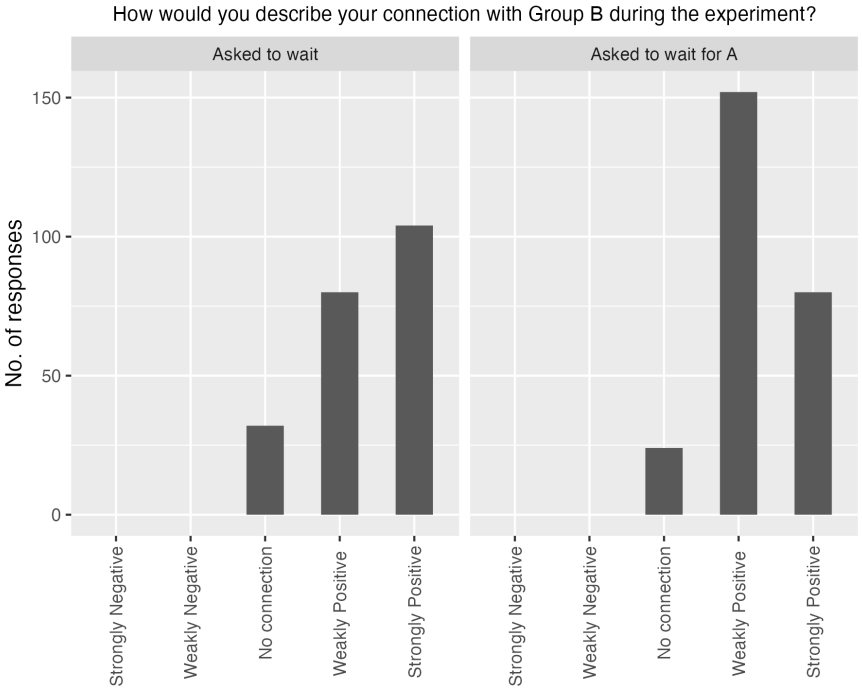
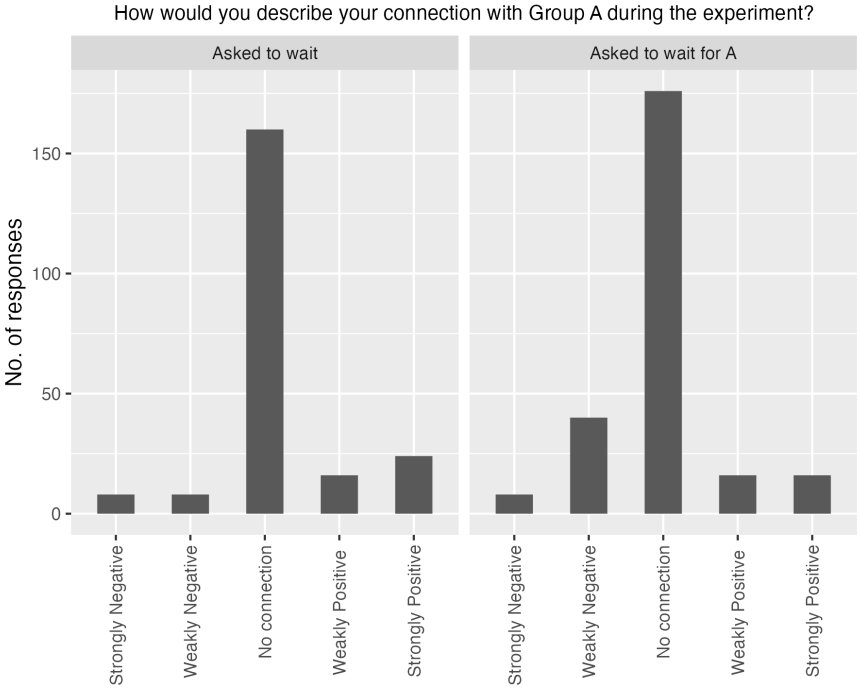


FIGURE A3 :
Reported connection of members of Groups B

(A)
With their in-group



(B)
With the out-group



APPENDIX B: INSTRUCTIONS

INSTRUCTIONS

Welcome, and thank you for participating.

You are about to participate in an experiment where you will be organized into groups. You will be interacting with other participants from your own group and those outside your assigned group. The entire session will take place through your computer terminal and is expected to last approximately 60 minutes.

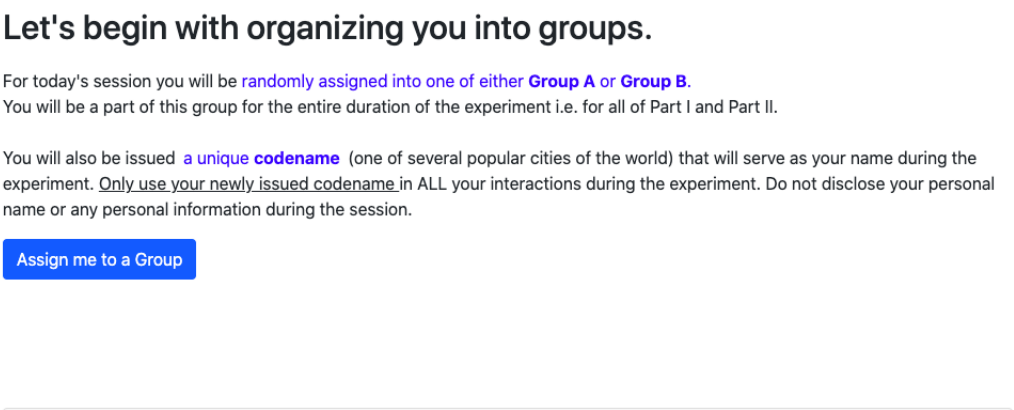
Please turn off your cellphones and similar smart devices now. Do not talk or in any way try to communicate with other participants unless instructed. If you have any questions, please raise your hand and your question will be answered so everyone can hear.

Earnings and Payments
You will receive 10 USD for completing today's session. In addition to this participation reward, you can earn more during tasks. Before each task, we will describe in detail how your earnings from the task will be determined. Your earnings will be calculated in Experimental Currency Units (ECU) and converted to US dollars at the end of today's session at a rate of 1 ECU = 0.4 USD.

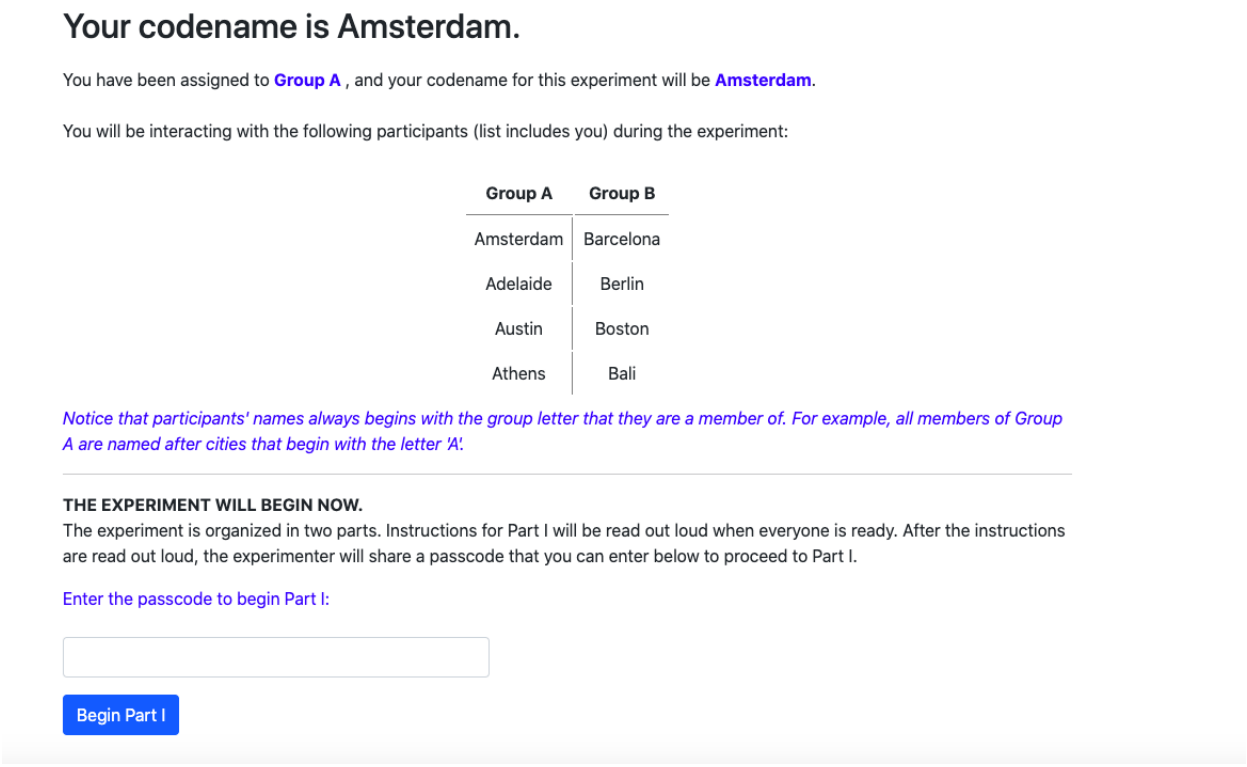
Outline of the Experiment
First, you will be organized into groups and assigned individual codenames. This will be followed by Part I and then Part II of the experiment.

Before each part begins, instructions for that part will be read out loud. If you have any questions, please raise your hand.

ON-SCREEN INSTRUCTIONS (INTRODUCTION)



[Screen for a representative participant who in this example is assigned to Group A and given codename 'Amsterdam']



INSTRUCTIONS FOR PART I

In Part I, you will be completing tasks with subjects from your own group. The details of each task will be described to you on your computer screen. If you have any questions, please raise your hand.

Instructions for Task I

Task I is a group quiz, and consists of 8 rounds. In each round, your group will be given one logical question to solve. The question will appear on the computer screens of all group members, and there will be a chat box at the bottom of the screen that you can use to discuss the answer.

After 60 seconds have passed, only one of you (randomly chosen) will see the option of submitting the answer for that round. The submitted answer should be final and cannot be changed. There is no time limit. After an answer is submitted, the rest of the group members will automatically proceed to the next round, without being informed of the answer that was submitted or who submitted the answer. No feedback will be given on whether the submitted answer was correct or not.

Earnings
For every correct answer submitted, all group members will earn 2 ECUs each. For any incorrect answer, there will be no earnings.

Chat Box
You can use the chat box to communicate with other members of your group. The chat history will not be erased between rounds of this task. Strictly comply by the following two very important rules when using the chat:

1. No personal information except your codename can be disclosed in the chat,
2. No profanity, harassment or hate-speech is allowed.

Chat history is recorded by the experimenter and will be monitored.

ON-SCREEN INSTRUCTIONS (PART I TASK I)

Part I: Instructions

In Part I, you will be completing tasks with subjects from your own Group.
The details of each task will be described to you on your computer screen. If you have any questions, please raise your hand.

Instructions for Task I:

Task I is a group quiz, and consists of 8 rounds. In each round, your group will be given one logical question to solve.
The question will appear on the computer screens of all group members, and there will be a chat box at the bottom of the screen that you can use to discuss the answer.

After 60 seconds have passed, only one of you (randomly chosen) will see the option of submitting the answer for that round. The submitted answer should be final and cannot be changed. There is no time limit. After an answer is submitted, the rest of the group members will automatically proceed to the next round, without being informed of the answer that was submitted, or who submitted the answer. No feedback will be given on whether the submitted answer was correct or not.

Earnings
For every correct answer submitted, all group members will earn 2 ECUs each. For any incorrect answer, there will be no earnings.

Chat Box:

You can use the chat box to communicate with other members of your group. The chat history will not be erased between rounds of this Task.
Strictly comply by the following two **very important rules** when using the chat:

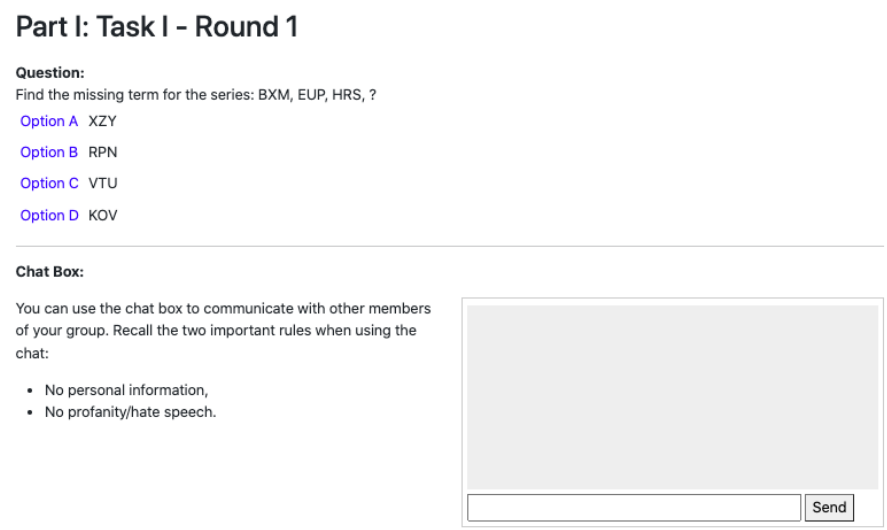
- No personal information except your codename can be disclosed in the chat,
- No profanity, harassment or hate-speech will be tolerated.

Chat history is recorded by the experimenter and will be monitored.

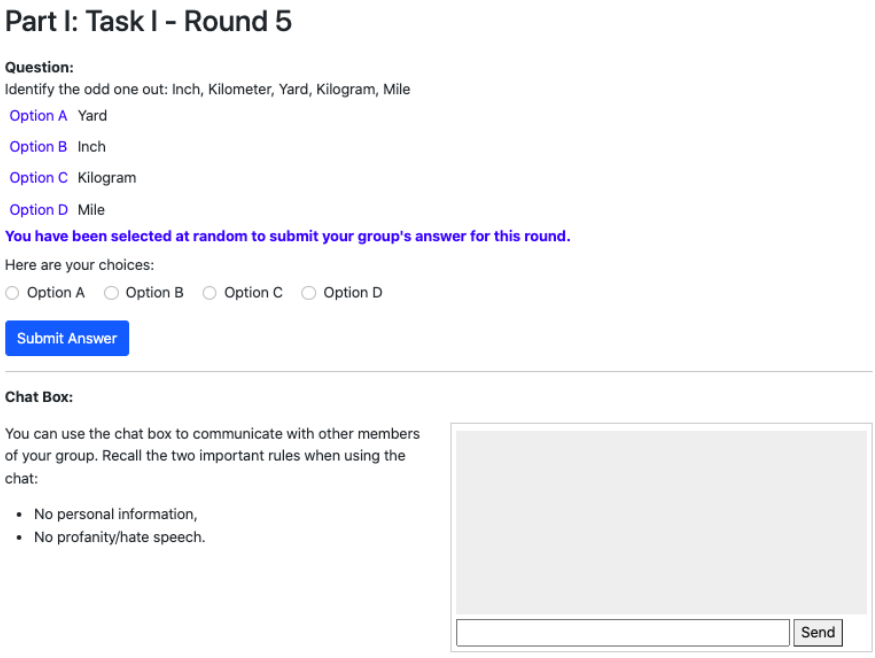
Begin Task I

[Screens for Part I: Task I Rounds 1-8 have the same structure]

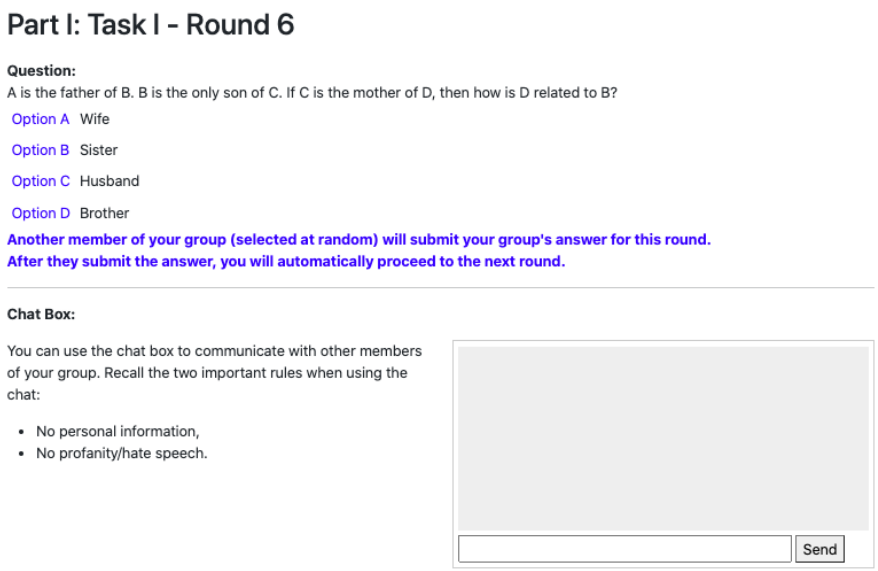
1. *Screen in the first 60 seconds:*



2. *Screen after 60 seconds (if participant chosen to answer):*



3. *Screen after 60 seconds (if participant not chosen to answer):*



ON-SCREEN INSTRUCTIONS (PART I TASK II)

[For participants assigned to GROUP A]

Task I Concluded. Onto Task II.

You just completed Task I of Part I.
You will be notified about the results of the group quiz and your earnings at the end of today's session.
The Chat Box will be disabled for the rest of the experiment.

Next, we will begin Task II.

Task II:

Task II is a ranking task. All members of your group will be asked to nominate two other group members (except themselves). The two group members who receive the most nominations will be awarded a bonus. These nominations are private and will not be shared with any other participant. Ties, if any, will be broken randomly.

Earnings/Bonus

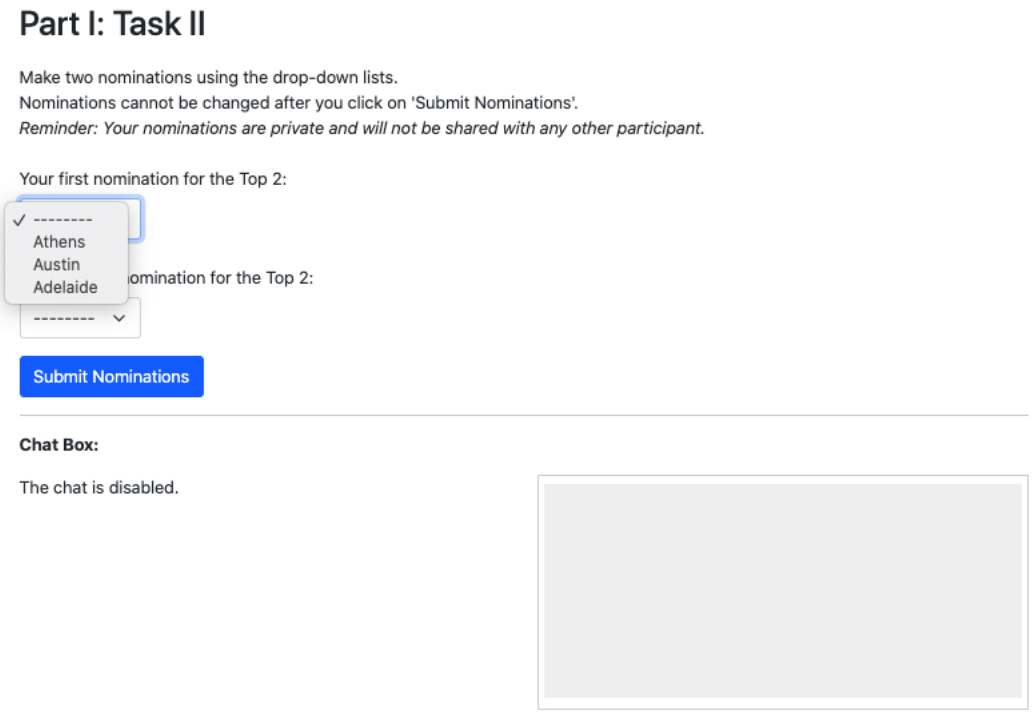
The Top 2 members who receive the most nominations will receive a bonus of 4 ECUs.
Others will make no earnings in this Task.

Begin Task II

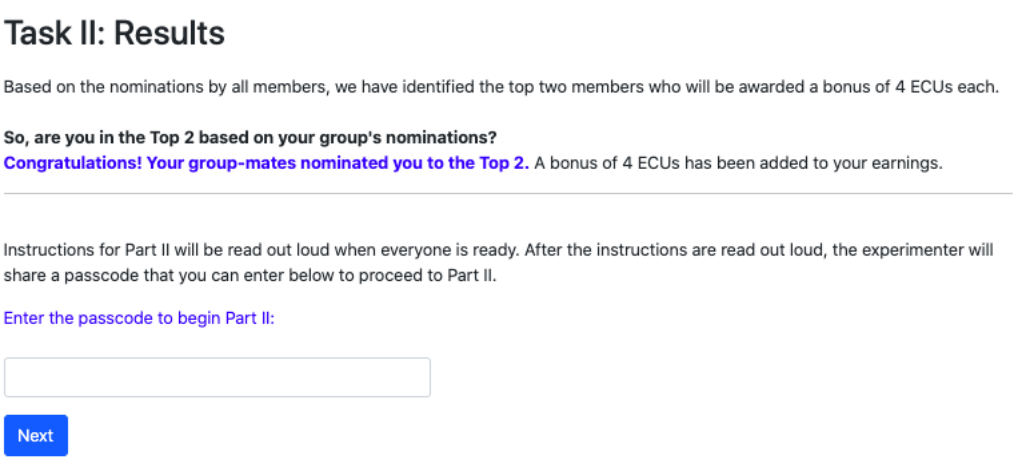
Chat Box:

The chat is disabled.

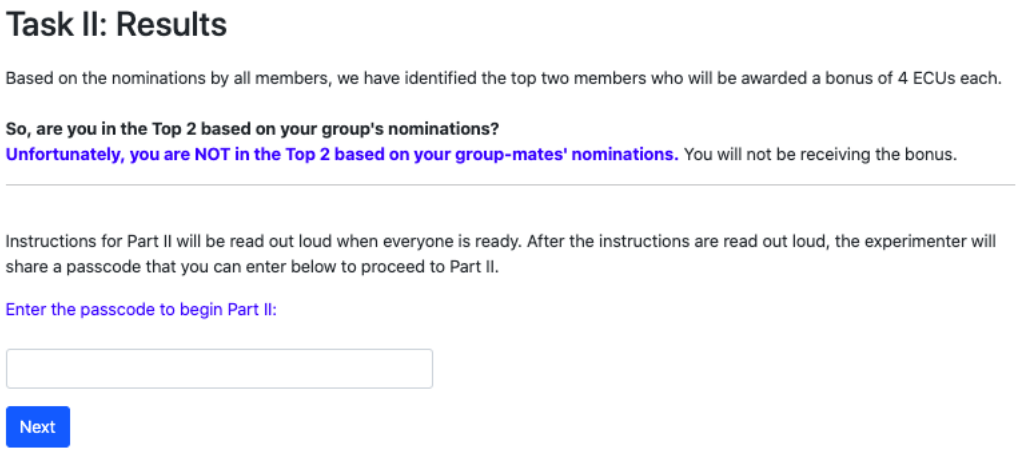
[For participants assigned to GROUP A: Next Screen]



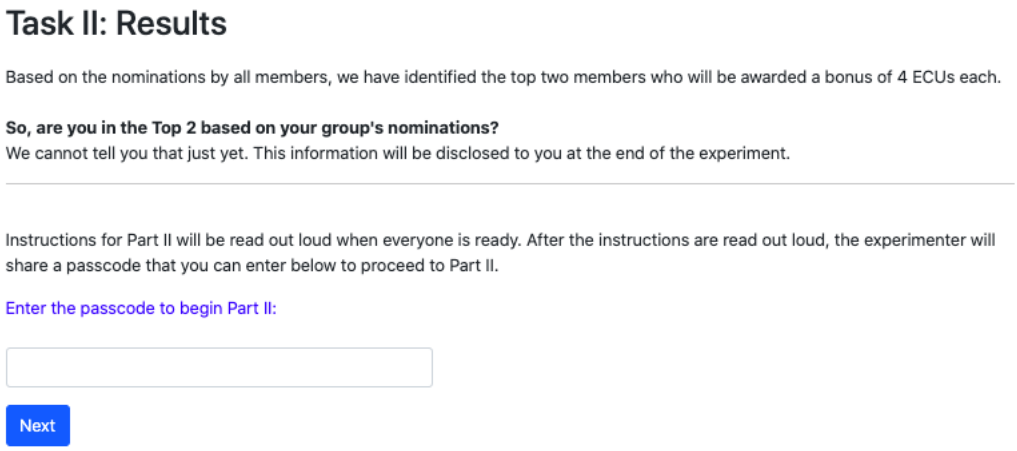
1. *Screen for Group A in Treatment (if ranked in the Top 2):*



2. *Screen for Group A in Treatment (if not ranked in the Top 2):*

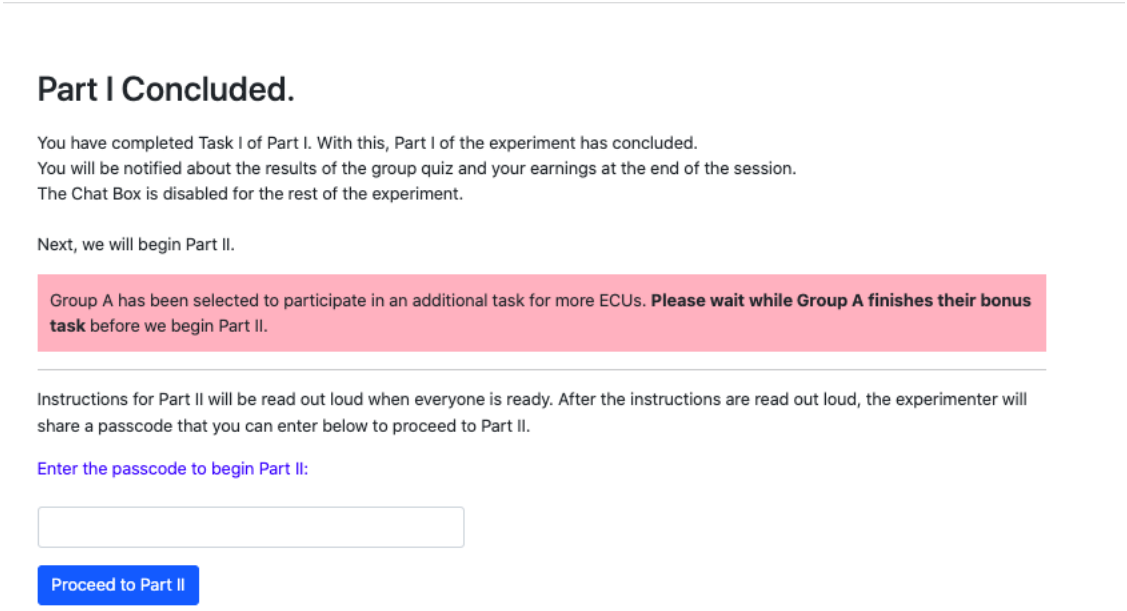


3. *Screen for Group A in Control:*

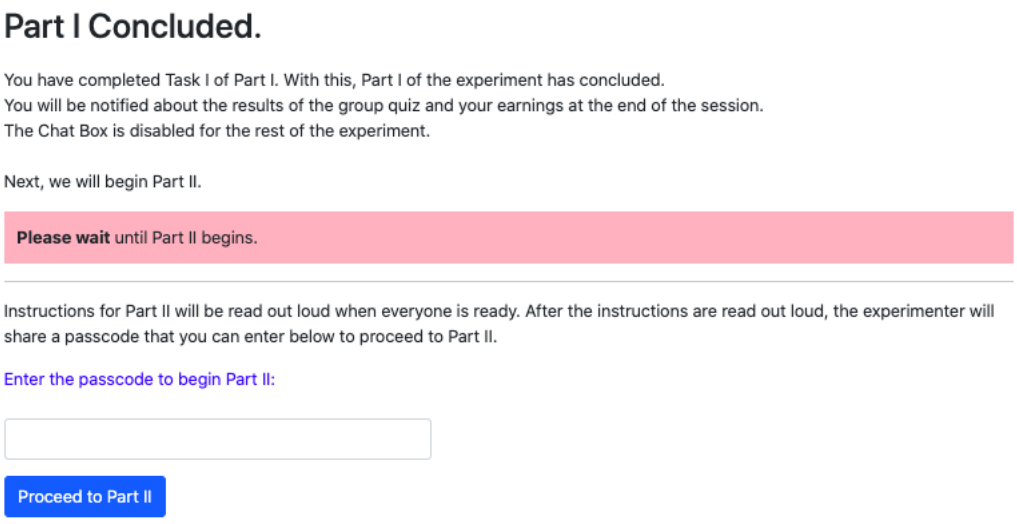


[For participants assigned to GROUP B]

1. *Screen for Group B in Treatment:*



2. *Screen for Group B in Control:*



INSTRUCTIONS FOR PART II

In Part II, you will complete tasks with participants from both groups. In these tasks, you will divide a sum of money between yourself and another participant from either Group A or Group B.

Each round will have the following structure:

- You will be matched with a participant and asked to divide a sum of ECUs between yourself and them. You are anonymous to your match. You are the "divider" in this pair.
- At the same time, you will also serve as a match for another participant who will divide a sum of ECUs between themselves and you. You are the "receiver" in this pair. You make no decisions as a "receiver".
- In every round, new matches are made.

You will play 8 rounds in total. In some rounds, you will be matched with two participants instead of one. In each round, as a "divider", you will decide how to divide the given sum of money between yourself and your match. You will receive no information and make no decisions as a "receiver" in that round.

Earnings
2 out of the total 8 rounds will be randomly chosen for payment.

For any round chosen for payment, each participant will be paid based on EITHER,

- the division determined by them as a "divider", OR
- the division determined by another participant, where they are the "receiver",

with a 50-50 chance.

If you have any questions, please raise your hand.

ON-SCREEN INSTRUCTIONS (PART II)

Part II: Instructions

In Part II, you will complete tasks with participants from both groups.
In these tasks, you will divide a sum of money between yourself and another participant from either Group A or Group B.

Each round will have the following structure:

- You will be matched with a participant and divide a sum of ECUs between yourself and them. You are anonymous to your match. You are the "divider" in this pair.
- At the same time, you will also serve as a match for another participant who will divide a sum of ECUs between themselves and you. You are the "receiver" in this pair. You make no decisions as a "receiver" in that round.
- In every round, new matches are made.

You will play 8 rounds in total. In some rounds, you will be matched with two participants instead of one. In each round, as a "divider", you will decide how to divide the given sum of money between yourself and your match. You will receive no information and make no decisions as a "receiver".

Earnings:
2 of the total 8 rounds will be randomly chosen for payment.
For any chosen round, each participant will be paid based on EITHER,

- the division determined by them as the "divider", OR
- the division determined by another participant, where they are the "receiver"

with a 50-50 chance.

Begin Part II

Matching for the next 4 rounds

For the next four rounds, you will be matched with one participant and asked to divide 10 ECUs between yourself and your match.

Match Description for each round:

- You will be the "divider" for someone from either Group A or Group B.
- You will be the "receiver" for someone from either Group A or Group B.

Earnings:

If any of these rounds are chosen for payment, each participant will be paid based on EITHER,

- the division determined by them as the "divider", OR
- the division determined by another participant, where they were the "receiver"

with a 50-50 chance.

Next

[Screen in any typical round among Rounds 1-4]

Part II - Round 1

In this round, you have to divide 10 ECUs between yourself and your match.
Your match in this round is **Barcelona** .

Athens, how many out of **10 ECUs** do you give ...

to yourself ? ECUs

to Barcelona ? ECUs

Submit

Matching for the next 2 rounds

For the next two rounds, you will be matched with two participants and asked to divide 20 ECUs between yourself and your matches.

Match Description for each round:

- You will be the "divider" for two participants. These two participants can either both be from Group A; or both from Group B; or one each from Group A and Group B.
- You will be the "receiver" for someone from either Group A or Group B.

Earnings:
If one of these rounds are chosen, each participant will be paid based on EITHER,

- the division determined by them as the "divider", OR
- the division determined by another participant, where they were the "receiver"

with a 50-50 chance.

Next

[Screen in any typical round among Rounds 5-6]

Part II - Round 5

In this round, you have to divide 20 ECUs between yourself and your matches.
Your matches in this round are **Berlin** and **Bali** .

Athens, how many out of **20 ECUs** do you give ...

to yourself ? ECUs

to Berlin ? ECUs

to Bali ? ECUs

Submit

Matching for the next 2 rounds

For the next two rounds, you will be matched with one participant and asked to divide 10 ECUs between yourself and your match.

Match Description for each round:

- If you are the "divider" for someone from Group A, then you will be the "receiver" for someone from Group B.
- If you are the "divider" for someone from Group B, then you will be the "receiver" for someone from Group A.

Earnings:

If one of these rounds are chosen, each participant will be paid based on EITHER,

- the division determined by them as the "divider", OR
- the division determined by another participant, where they were the "receiver"

with a 50-50 chance.

Next

[Screen in any typical round among Rounds 7-8]

Part II - Round 7

In this round, you have to divide 10 ECUs between yourself and your match.
Your match in this round is **Barcelona** .

Austin, how many out of **10 ECUs** do you give ...

to yourself ? ECUs

to Barcelona ? ECUs

Submit

[End-of-Session Survey]

End of the Experiment

Part II has now concluded. With that, today's experiment has also concluded.
You will be given a summary of all your earnings throughout today's experiment and the final payout amount. Before that, please take a few minutes to complete the following survey:

What do you think this experiment is studying?

How would you describe your connection with Group A during the experiment?

○ Strongly Negative ○ Weakly Negative ○ No connection ○ Weakly Positive ○ Strongly Positive

How would you describe your connection with Group B during the experiment?

○ Strongly Negative ○ Weakly Negative ○ No connection ○ Weakly Positive ○ Strongly Positive

In Part I Task II, all members of your group were asked to nominate two members of your group for a bonus. What do you think was the criterion others used to make their nominations?

○ Based on contributions during Group Quiz in Task I
○ Random Choice
○ Based on reasons unrelated to Task I

In Part II, as a "divider", what about your match(es) influenced how many ECUs you gave to them?

Submit