Appendix

A1 Payoff Tables

Tables A1, A2 and A3 show the parameter values w_t, x_t, z_t, and y_t used in the three parts of the experiment, starting with the 10 rounds of Random Dictator (rounds 1-10), followed with 10 rounds of the Pairvise Voting (rounds 11-20), and Coalition Voting (rounds 21-36). The rows with a blank value for w_t are symmetric allocations with members of the majority receiving x_t and members of the minority receiving z_t.

Table A1: Payoff values for each round in the Random Dictator task

Round	Payoffs			
	w_t	x_t	z_t	y_t
1		26	16	24
2		26	16	20
3		30	10	24
4		30	10	20
5		34	4	24
6		34	4	20
7	28	25	16	24
8	34	28	10	24
9	36	33	4	24
10	38	32	4	24

Table A2: Payoff values for each round in Pairwise Voting task

Round	Payoffs			
	w_t	x_t	z_t	y_t
11	34	28	10	24
12		34	4	24
13		30	10	24
14		34	4	32
15	42	30	4	24
16		26	16	24
17		34	4	28
18	32	29	10	24
19	28	25	16	24
20		30	10	28

Table A3: Payoff Values for each round in Coalition Voting task

Round	Payoffs			
	w_t	x_t	z_t	y_t
21		30	10	24
22		34	4	24
23		30	10	16
24		30	10	20
25		26	16	24
26		34	4	16
27		34	4	20
28		26	16	20
29	28	25	16	20
30	36	33	4	24
31	28	25	16	20
32	42	30	4	24
33	32	29	10	20
34	32	29	10	24
35	34	28	10	24
36	38	32	4	24

A2 Inequity Aversion Analysis

In the Fehr-Schmidt (Fehr and Schmidt, 1999) model, an individual i's preference for an allocation depends on their own payoff x_i and the differences between their own payoff and others' payoffs x_j, $j \neq i$, represented by the utility function

$$u_i(x) = x_i - \frac{1}{n-1} \sum_{j \neq i} (\alpha_i \max\{x_j - x_i, 0\} + \beta_i \max\{x_i - x_j, 0\}) \tag{2}$$

where n is the number of group members, α_i is a parameter that captures the degree of aversion to disadvantageous inequality (envy), and β_i parameterizes aversion to advantageous inequality (guilt).

Given the majority payoff x, minority payoff z, and the fair payoff y, an individual will prefer the equal outcome to the symmetric majority outcome if

$$y \geq x - \beta_i \left(\frac{x-z}{2} \right) .$$

If individual i chooses the equal outcome, then we can infer from that choice that $\beta_i \geq \beta^*$, while we can infer from the choice of majority outcome that $\beta_i \leq \beta^*$, where

$$\beta^* = \frac{2x - 2y}{x - z} . \tag{3}$$

Table A4 shows the payoff values for each round of the *Random Dictator* task, with the corresponding values of β^* computed using equation (3) shown for rounds 1-6.

Table A4: Payoff values for Random Dictator allocations

Round	w_t	x_t	z_t	y_t	β^*
1	–	26	16	24	0.40
2	–	26	16	20	1.20
3	–	30	10	24	0.60
4	–	30	10	20	1.00
5	–	34	4	24	0.67
6	–	34	4	20	0.93
7	28	25	16	24	0.19
8	34	28	10	24	0.38
9	36	33	4	24	0.59
10	38	32	4	24	0.52

In principle, we can also infer individual i's value of α_i from their choices between the equal and asymmetric majority allocations when their majority allocation payoff is x, as it is in the *Random Dictator* mechanism, and provided that we fix the value of β_i inferred from their choices between fair and symmetric allocations. However, we do not have sufficient variation in our parameter values to be able to identify α_i with as much accuracy or precision. We therefore make the following simplifications in our analysis. First, following FS, we assume that $\alpha_i \geq \beta_i$ for all participants. participant i will choose the equal allocation over the asymmetric majority option if

$$y \geq x - \alpha_i \left(\frac{w - x}{4} \right) - \beta_i \left(\frac{x - z}{2} \right) . \tag{4}$$

If a participant chooses the equal allocation when the estimated value of β_i would otherwise predict an unequal outcome, then we can infer that i is more responsive to envy (disadvantageous inequality) than to guilt (advantageous inequality), such that

$$\alpha_i \geq \frac{4x - 4y - 2\beta_i(x - z)}{w - x} . \tag{5}$$

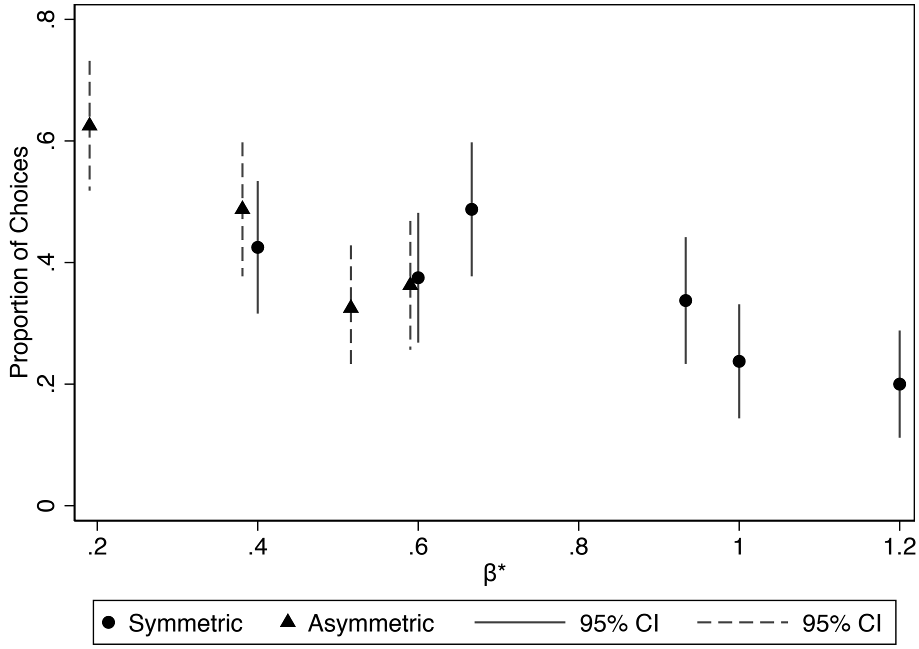
Otherwise, we assume that $\alpha_i = \beta_i$. Substituting into equation (4), observing the equal outcome implies

$$\beta_i \geq \frac{4x - 4y}{w + x - 2z} , \tag{6}$$

and the thresholds β^* in Table A4 for rounds 7-10 are computed using the expression on the right-hand side of (6).

We computed individual-specific measures of inequity aversion as follows. For each round k, let β_k^* denote the corresponding threshold defined by equation (3), as shown in Table A4. Every equal allocation choice made by participant i implies an inequality aversion

Figure A1: Equal Allocations Chosen in Random Dictator Rounds



parameter greater than the threshold, $\beta_i > \beta_k^*$. Thus, define the maximum value of β_k^* for all of i's fair choices to be $\underline{\beta_i}$. This is the lower bound for β_i because i's choices implied $\beta_i \geq \underline{\beta_i}$. Similarly, the upper bound $\overline{\beta_i}$ is computed as the minimum value of β_k^* for the rounds k in which i chooses the majority option, since their choices revealed $\beta_i \leq \overline{\beta_i}$. participant i's behavior is completely consistent with the FS model if $\underline{\beta_i} < \overline{\beta_i}$.

Figure A1 shows the proportion of equal allocation choices disaggregated by round as a function of the inequality between the equal and majority allocations, where the inequality between the options is measured as the threshold level of inequality aversion required to prefer the equal allocation in the FS model (the values of β^* given in Table A4). A majority of participants chose the equal allocation when the FS only requires mild inequality aversion to do so (63% of participants choose the equal allocation when $\beta^* = 0.19$), whereas far fewer participants chose the equal allocation when the FS model requires a strong degree of inequality aversion (20% chose the equal allocation when $\beta^* = 1.2$). The negative relationship shown in Figure A1 between β^* (horizontal axis) and equal allocation choices (vertical axis) suggests that the FS model is a reasonable, albeit imperfect, way of modeling social preferences.[5]

[5]It is also apparent from the uptick in the middle of Figure A1 that the FS model does not perfectly fit the data. There may be several reasons for this. One is simply that participants make random errors, so incorporating the FS framework into a random utility model might fit the data better. Another may be due to the loss of fit from our simplification of the FS model from a two-parameter model (α, β) to a one-parameter model ($\alpha = \beta$). It may also be that an alternative model of social preferences such as the ERC model of Bolton and Ockenfels (2000) or a model that also incorporates a concern for efficiency would be more appropriate. Nevertheless, the FS model is consistent enough for our analysis.

A3 Regression Analysis

We present more complete statistical analyses in Tables A5 and A6 in the form of linear probability models, which control for differences in payoff values (across rounds and parts), heterogeneity in individual fairness preferences, and experience. The models also account for the non-independence of observations in the form of subject-level random effects and session-clustered standard errors. The analysis combines observations from both *Pairwise Voting* and *Coalition Voting* rounds, and the results in Table A5 support the conclusions we drew from the aggregate analysis. More specifically, discussion has a positive, statistically significant effect on the likelihood of voting for the equal allocation, with numerical estimates ranging from a 9.3% to 13.7% increase. We also find that while the probability of voting for the equal allocation is slightly lower in *Coalition Voting* than in *Pairwise Voting*, the difference is not statistically significant. Thus, we conclude that discussion has a positive effect on individual fairness behavior, but this effect is limited to the *Pairwise Voting* environment.

In terms of the other correlates of fair voting, the effect of payoff differences are consistent with what we would expect from a mix of selfish and inequity averse preferences. For example, the larger the difference between the majority payoff x and the fair payoff y, the less likely an individual is to choose the equal allocation. Similarly, individuals are also less likely to vote for the equal allocation as the difference between the high payoff w and the median majority payoff x increases. Purely selfish voters would not pay attention to the difference between the fair payoff y and the low payoff z, yet as this difference increases (equivalently, the worse the minority payoff becomes), the more likely it is that a subject will vote for the equal outcome. In addition, the results suggest that behavior does not change over time as a result of subjects gaining more experience.

The alternative specifications in the columns of Table A5 vary the covariates used to account for individual preferences. Model (1) is a basic model that excludes individual controls. Models (2) and (3) control for inequity aversion using the lower bound measure $\underline{\beta_i}$, while models (4) and (5) use the upper bound measure $\overline{\beta_i}$. Models (6) and (7) use a simpler measure of an individual's concern for fairness: the percentage of fair dictator choices in Part 1 (which does not depend on the FS model). Models (3), (5), and (7) include additional covariates from the questionnaire administered at the conclusion of the experiment. We include gender (male), a survey measure of generalized trust, and survey measure of risk attitudes.[6] Regardless of which measure of inequity aversion we use in our analysis, we find that inequity aversion revealed in the dictator task has a consistently positive, statistically significant, relationship with voting for the equal allocation. Trust and risk attitudes are also consistently associated with voting behavior, but gender is not.

The analysis of group decisions presented in Table A6 also supports the conclusions we drew from the aggregate analysis. Models (1) and (2) combine observations from both Parts 2 and 3, while models (3) and (4) restrict the analysis to *Pairwise Voting* rounds and models (5) and (6) restrict attention to *Coalition Voting* rounds. When we control for differences in payoff values across rounds as well as heterogeneity in the composition of fairness prefer-

[6] The trust question is worded: "On a scale from 1 to 7, generally speaking, would you say that most people can be trusted (1) or that you can't be too careful in dealing with people (7)." The risk question is worded: "On a scale from 1 to 7, how do you normally see yourself: Are you generally a person who is fully prepared to take risks (1) or do you try to avoid taking risks (7)?"

Table A5: Analysis of Individual Voting for Equal Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Chat in Part 2	0.127**	0.137***	0.124***	0.105*	0.093*	0.132**	0.119**
	(0.042)	(0.040)	(0.036)	(0.046)	(0.044)	(0.041)	(0.037)
Chat in Part 3	0.014	0.024	0.011	-0.008	-0.020	0.018	0.006
	(0.139)	(0.133)	(0.132)	(0.136)	(0.137)	(0.131)	(0.130)
Part 3	-0.074	-0.074	-0.073	-0.074	-0.073	-0.074	-0.073
	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)
Majority in Part 2	-0.419***	-0.419***	-0.418***	-0.419***	-0.418***	-0.419***	-0.418***
	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
$w - x$	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$x - y$	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$y - z$	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Experience	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Ineq. Aver. ($\underline{\beta}$)		0.166***	0.151***				
		(0.044)	(0.042)				
Ineq. Aver. ($\overline{\beta}$)				0.210**	0.208**		
				(0.071)	(0.074)		
Pct. Fair Dictator						0.239***	0.226***
						(0.058)	(0.060)
Male			-0.014		-0.012		-0.012
			(0.036)		(0.046)		(0.038)
Trust			-0.042**		-0.044*		-0.043*
			(0.016)		(0.019)		(0.019)
Risk			0.026*		0.033**		0.028*
			(0.012)		(0.012)		(0.011)
Constant	0.922***	0.823***	0.901***	0.803***	0.855***	0.827***	0.900***
	(0.045)	(0.028)	(0.051)	(0.035)	(0.051)	(0.035)	(0.068)
R^2 overall	0.126	0.158	0.185	0.150	0.181	0.160	0.188
R^2 between	0.036	0.151	0.247	0.121	0.235	0.156	0.259
R^2 within	0.161	0.161	0.161	0.161	0.161	0.161	0.161
Observations	2,080	2,080	2,080	2,080	2,080	2,080	2,080

GLS regression with subject-level random effects, standard errors clustered by session
* $p < .05$ ** $p < .01$ *** $p < .001$

Table A6: Analysis of Group Decisions for Equal Outcomes

	Combined		Part 2 only		Part 3 only	
	(1)	(2)	(3)	(4)	(5)	(6)
Part 2 Chat	0.095	0.026	0.102	0.039		
	(0.073)	(0.081)	(0.076)	(0.069)		
Part 3 Chat	-0.261*	-0.297*			-0.267**	-0.306*
	(0.067)	(0.087)			(0.064)	(0.101)
Part 3	0.379**	0.460**				
	(0.079)	(0.069)				
$w - x$	-0.005	-0.006	0.004	0.002	-0.014	-0.015
	(0.006)	(0.006)	(0.009)	(0.008)	(0.012)	(0.012)
$x - y$	-0.019*	-0.020*	-0.029**	-0.029**	-0.019	-0.019*
	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
$y - z$	0.010**	0.010**	0.014	0.014	0.011	0.011
	(0.002)	(0.002)	(0.006)	(0.006)	(0.005)	(0.005)
Experience	-0.002	-0.001	0.004	0.006	0.001	0.001
	(0.003)	(0.003)	(0.015)	(0.015)	(0.003)	(0.003)
Median Ineq. Aver $(\underline{\beta})$	0.091		0.147		0.063	
	(0.054)		(0.123)		(0.078)	
Median Ineq. Aver $(\overline{\beta})$		0.164		0.043		0.228
		(0.090)		(0.174)		(0.154)
Min. Maj. Ineq. Aver. $(\underline{\beta})$	0.175*		0.151*			
	(0.045)		(0.051)			
Min. Maj. Ineq. Aver. $(\overline{\beta})$		0.308**		0.420		
		(0.048)		(0.173)		
Number of Males	-0.005	-0.012	0.003	-0.011	-0.010	-0.016
	(0.012)	(0.017)	(0.025)	(0.035)	(0.015)	(0.020)
Constant	0.651**	0.558**	0.540	0.500	1.022***	0.971***
	(0.097)	(0.092)	(0.250)	(0.241)	(0.048)	(0.053)
R^2	0.163	0.149	0.128	0.084	0.204	0.210
Observations	416	416	160	160	256	256

OLS regressions with standard errors clustered at session level

* $p < .05$ ** $p < .01$ *** $p < .001$

ences in each group, the regression estimates show that discussion significantly depresses the probability of the equal outcome, but this effect holds only for *Coalition Voting* rounds. We also find a significant difference in equal outcomes across the different voting mechanisms: Groups are significantly more likely to choose equal outcomes with *Coalition Voting* than with *Pairwise Voting*. This within-subjects difference suggests that the introduction of the coordination problem causes groups to choose the focal outcome.

The particular composition of each group in terms of the distribution of inequity aversion only matters for outcome in the *Pairwise Voting* mechanism. We included two kinds of group-level covariates in the models. We included the median level of inequity aversion in each group (the median value of the lower bound $\underline{\beta_i}$ or upper bound $\overline{\beta_i}$) as well as the minimum value of the group members assigned to the majority payoff (for rounds in Part 2). The coefficient for the median level of inequity aversion in a group is consistently positive, but the magnitude varies and the estimate is not statistically significant. However, the minimum majority coefficient is positive and statistically significant in models (1) and (3) when we use the lower bound measure; the corresponding coefficient for the upper bound measure is positive in both (2) and (4) but only statistically significant in (2).

A4 Chat Analysis

How did subjects use their opportunity to communicate? In this section, we analyze chat messages. Our main finding is that group members primarily used communication instrumentally to state their preferred outcome or intended behavior. Few subjects used the chat technology to persuade or argue, and when they did, it was rarely effective.

Group members did not talk or say much when they used the chat technology. Figure A2 shows the average volume of chats over time within each period. There is a burst of activity early on that dies down and levels out after 20 seconds, with some intermittent activity in the remaining 55 seconds available to communicate. Members communicate more in the *Coalition Voting* than *Pairwise Voting*, likely due to the coordination problem introduced in the former. Figure A3 shows the distributions of the length of messages in terms of the number of characters (upper panel) as well as the number of words (bottom panel). While some subjects write lengthy messages (up to 100 characters or 16 words), no subject writes anything as long as a tweet. Strikingly, the modal message—nearly 40% of all messages—consists of a single character. These single characters refer to the allocations (e.g., A, B, C, etc) in the group's choice set.

If we look more closely at the chat transcripts, we can get a sense of the dynamics of the discussion and see why the messages are so brief. We will look at two rather typical examples from *Coalition Voting* rounds. The first example is taken (verbatim) from Session 3, Round 21, Group 1:

Figure A2: Time and Volume of Messages in Chat Treatment

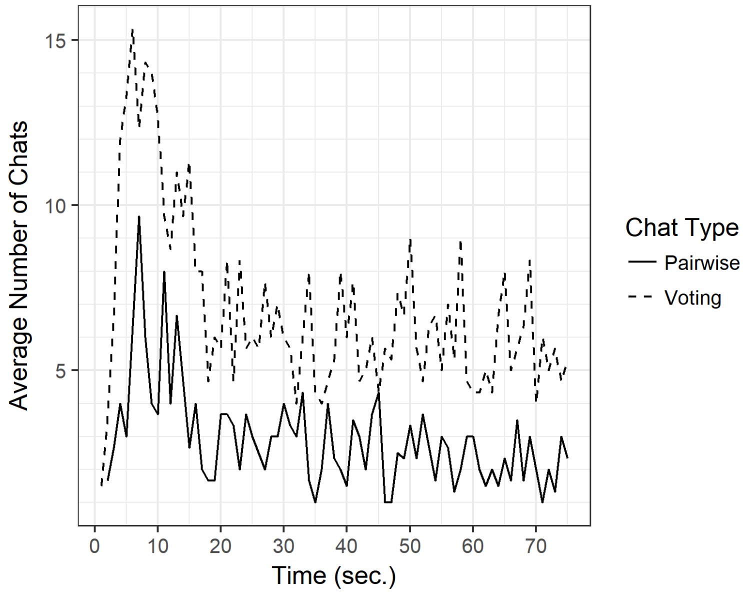
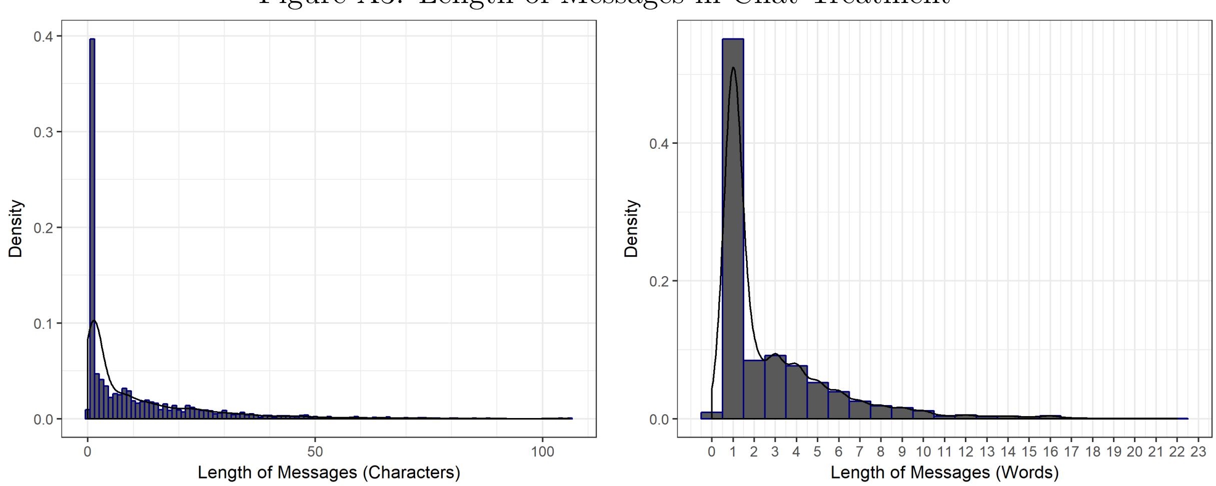


Figure A3: Length of Messages in Chat Treatment



Green (1)	I
Red (6)	I?
Grey (9)	I
Blue (7)	I
Red (6)	thats the only one where everyone gets the same thing
Yellow (4)	yep
Green (1)	Exactly
Grey (9)	I think we should just keep like that the whole part

The first four messages contain the label of the equal allocation (I). Note that one member (Red) includes a question mark, which seems to suggest that the message is meant as a question to the group (as in "should we do I?"), although it could also indicate the tentativeness of Red's own intentions. Once a majority of group members have signaled this intention, Red then points out the obvious, that Option I gives equal payouts, which Yellow and Green then confirm. This group appears to use communication to quickly come to an agreement, but what's interesting is that only one of these group members (Green, who spoke first) chose the equal allocation in the corresponding *Random Dictator* round. The other four members chose the majority option as dictators, yet this brief discussion was enough to move them towards voting for and adopting the equal allocation.

The next example is from Session 1, Decision 36, Group 1, and it is a group that ultimately chose majority tyranny:

Blue (4)	B
Green (14)	B
Grey (11)	N
Yellow (15)	grey and red n
Red (2)	N
Green (14)	knew that was coming
Blue (4)	stop no one watns 4
Grey (11)	SORREY
Red (2)	h2p
Green (14)	B have a soul. how would you explain to your grandma your decision making

As with the previous group, only one player (Blue) chose the equal allocation in the corresponding dictator round and was the first to speak, suggesting the equal allocation (B). Green, who chose the majority option in the dictator round, next agrees to the equal allocation, but then this group quickly takes a divergent path. Grey suggests an unequal allocation (N), followed by Yellow. Note that Yellow addresses Grey and the remaining player, Red, who signals intent with a single character. Green then expresses disappointment, but at first does nothing to try to persuade the majority. Interestingly, Grey (who first suggested the unequal allocation) apologizes. Finally, Green attempts to guilt the majority into choosing the equal allocation, to no avail: the group chooses Option N.

Appendix: Instructions for Chat Treatment

General Information

This is an experiment on group decision-making. You will be paid in cash for your participation at the end of the experiment. The exact payment you receive will depend partly on your decisions, the decisions of others, and on chance. You will be paid privately, meaning that no other participant will find out how much you earn.

Pay attention and follow the instructions closely, as we will explain how you will earn money and how your earnings will depend on the choices that you make. Each participant has a printed copy of these instructions, and you may refer to them at any time.

If you have any questions during the experiment, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment except when asked to do so via the computer interface. Please also silence your phones and put them away along with other personal belongings.

Parts, Rounds, and Groups

This experiment consists of three **parts**, and we will explain the instructions for each part before beginning that part. In each part, there is a series of **rounds**. Each round is a separate decision task.

For each round, you will be randomly assigned to a **group** of 5 participants. Because groups are randomly reassigned for each round, some members of your group for one round may or may not be the same as the members of your group for another round.

Each group member will then be assigned to a unique color to identify you (red, green, blue, yellow, or grey). These colors will also be assigned anew before each round so that a participant's color for one round may or may not be the same as for another round.

Note that you will not know the identity of any of the other participants you are matched with in any round, and your earnings for each round will depend only on the choices of the members of your group. Your group's decision in any round is entirely separate from any other other group's decision.

Payoffs

We will **randomly select one round to count** for payment from the entire session, with each round being equally likely to be selected. Only the points you receive from the round that counts will be used to calculate your payment, so you should think of each round as separate from any other.

Payoffs during the experiment will be denominated in **points**. Points will be converted to cash at the rate of **75 cents per point**, and then we will add $7 to your earnings for completing the experiment (this includes the $5 for showing up on time). At the end of the experiment, you will see the points you earned in the round that counts and your total earnings for the experiment.

Part 1

For each round in this part, you will make a choice between two options. Each option specifies how many points to give to yourself and to each of the other group members. For example, Option A in the table below gives you and every other group member 25 points, while Option B gives you 30 points, 30 points each to Green and Yellow, and 10 points each to Blue and Grey. The number of your points will always be displayed in the left-most column.

	Red (You)	Blue	Green	Yellow	Grey
Option A	25	25	25	25	25
Option B	30	10	30	30	10

If this round is selected to count for payment, we will randomly select one member's decision to be implemented within each group. In other words, if your decision is selected, then the number of points that each member in your group receives depends only on your decision. If another group member's decision is selected, then the number of points you receive will depend only on that selected member's decision and not your own.

Your options will differ in each round, and other group members may not necessarily have the same options that you do.

You will not receive any feedback about the options that were selected in the round by any of your group members in Part 1. You will only find out the number of points you earned at the end of the experiment for the round that counts.

Before beginning Part 1, we will ask you a few questions to make sure that you have fully understood these instructions.

Part 2

For each round in this part, each group's task is to select one of two options by a majority vote. As in Part 1, each option specifies how many points to give to each group member. Your points will always be displayed in the left-most column. Every member in your group will see the same two options, but the order of the rows and columns for each player may be different.

The voting procedure is as follows:

- You will cast your votes at the same time.
- Each group member has one vote, and abstentions are not allowed.
- **An option is selected by your group only if it receives three or more votes**.

Before you vote in each round, you will have 75 seconds to communicate electronically with members of your group through a chat window on your screen. Each message you send will be seen by all members of your group. Please refrain from using obscene or offensive language, and do not enter any message that identifies or describes you in any way (such as your age, gender, race, appearance, etc).

After you vote, you will not receive any feedback about the number of votes cast for each option, nor will you find out which option was selected by your group in any round in Part 2. You will only find out the number of points you earned at the end of the experiment for the round that counts.

Before beginning Part 2, there will also be a few questions on your computer to make sure that you have fully understood these instructions.

Part 3

For each round in this part, each group will select one of six options by majority vote. As in Part 2, each group member casts one vote, and an option is selected by the group only if it receives three or more votes.

An example of what the six options might look like is given in the table below. You will see a table like this in each round, and your points from each option will always be shown in the left-most column. Every group member will see the same six options, but the order that the rows and columns appear in the table will be different for each group member.

	Red (You)	Blue	Green	Yellow	Grey
Option A	10	30	30	10	30
Option B	30	10	30	30	10
Option C	10	30	30	10	30
Option D	30	10	10	30	30
Option E	25	25	25	25	25
Option F	30	30	10	30	10

The voting procedure in Part 3 is as follows:

- You will cast your votes at the same time.
- Each group member has one vote, and abstentions are not allowed.
- **An option is selected by your group only if it receives three or more votes**.
- After you vote, you will be informed of the number of votes cast for each option, but you will not know how individual group members voted.
- If an option does not receive at least three votes, your group will vote again. The number of votes required to select an option on the second ballot is the same as for the first ballot: an option is selected only if it receives three or more votes.
- If no option receives at least three votes on the second ballot, then each player will receive 0 points for the round.

Before each ballot, you will have 75 seconds to communicate electronically with members of your group through a chat window on your screen. Just as in Part 2, each message you send will be seen by all members of your group, please refrain from using obscene or offensive language, and do not enter any message that identifies or describes you in any way.

Before beginning Part 3, there will also be a few questions on your computer to make sure that you have fully understood these instructions.