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RESEARCH ARTICLE

Discussion and Fairness in a Laboratory Voting Experiment*†

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Abstract
We conduct a laboratory experiment to investigate whether public discussion before a majority vote increases the saliency of minority interests and results in more egalitarian outcomes or whether voters use discussion to form majorities that benefit at the expense of minorities. When there are two alternatives, we find that public discussion increases the likelihood that individuals vote for equal allocations, but has little to no impact on the group outcomes. When participants choose among one equal and several unequal options, the multitude of unequal options creates a coordination problem, and we find that discussion decreases the frequency of egalitarian decisions. Our findings suggest that the effect of public communication on the fairness of majority voting outcomes depends on the strategic environment.

Keywords: voting; social preferences; communication

When voters' material self-interest is at stake, majority rule potentially allows a majority to tyrannize a minority. But as Kittel et al. (2014, F196) remind us, there is more to democracy: "in almost all voting situations individuals engage in communication prior to voting." Indeed, political philosophers and democratic theorists argue that deliberation and public communication before voting produces

This article has earned badges for transparent research practices: Open Data and Open Materials. For details see the Data Availability Statement.

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better-informed, more legitimate choices and generates outcomes that are more egalitarian, fair, and consistent with an idea of the common good (Gutmann and Thompson, 1996; Landemore, 2012). However, communication can be used for strategic purposes and undermine the social benefits of deliberation, such as when communication is private (Agranov and Tergiman, 2014; Baranski and Kagel, 2015; Pronin and Woon, 2022).

Motivated by considerations that majorities may tyrannize the minority, that discussion may enhance fairness, but that strategic uses of communication may undermine it, we design a laboratory experiment to investigate whether public discussion preceding a majority vote increases the fairness of individual voting behavior and collective decisions. Using a laboratory experiment allows us to control participant incentives and the strategic environment, measure individual and group outcomes, and make theory-driven inferences (Morton and Williams, 2010).

In our design, we focus on the interaction between voting and public communication, abstracting from other features of collective choice, such as proposal power or entitlements. Groups are tasked with choosing between egalitarian and inegalitarian allocations, with the latter giving more to members of the majority, and the experiment varies how groups make decisions. First, group members make choices as random dictators. This allows us to measure each members' degree of inequity aversion and to determine the extent to which their votes reflect their underlying social preferences. Second, group members vote between a pair of alternatives, with the majority and minority members randomly assigned. This pairwise voting environment entails no strategic complexity, so comparing majority decisions with and without communication allows us to gauge whether there are social or psychological effects of public discussion, rather than just strategic ones. Third, we increase the number of unequal options, where each unequal allocation involves a different majority subset of the group, introducing a challenging coordination problem. We also vary the asymmetry of majority payoffs to create majority rule instability and exacerbate the coordination problem. We hypothesize that communication makes it easier for majority coalitions to form.

We find that groups frequently choose equal allocations, with and without public communication. In the pairwise voting environment, communication increases the likelihood that individuals vote for the equal outcome above what would be expected based on what the random dictator mechanism reveals about their social preferences. However, communication does not change pairwise group decisions.

When there are multiple unequal allocations and participants cannot communicate, they almost always select the equal allocation, consistent with focality as a solution to the coordination problem. With communication, participants use discussion to coordinate majority coalitions, increasing the frequency of unequal allocations. Thus, a key finding is that public discussion promotes or undermines the fairness of majority rule, depending on the strategic environment.

Our study follows Becky Morton's many contributions to our understanding of voting mechanisms using laboratory experiments (Morton, 1987, 1999; Morton and Williams, 2001; Battaglini et al., 2008, 2010; Bassi et al., 2011; Morton and Tyran, 2011; Morton et al., 2019). Notably, our experiment investigates the equity of behavior and outcomes in electoral and democratic institutions, an important consideration found throughout her body of scholarship (Gerber et al., 1998;

Battaglini et al., 2007; Morton and Ou, 2019). Like Diermeier and Morton (2005), we find that majoritarian institutions generate more egalitarian outcomes than purely self-interested rational choice theories predict. Relatedly, Morton et al. (2020) find that communication prior to voting reduces the detrimental effect of social identity as a barrier to coordination. More broadly, our results complement Kittel et al. (2014) in questioning an overly optimistic view of deliberative democracy by its proponents.

Theoretical effects of communication

We consider two scenarios where we expect communication to have contrasting effects on the likelihood of equal allocations being chosen. In *pairwise voting*, groups choose between a pair of alternatives (one equal and one unequal allocation). In *coalition voting*, they choose between more than two alternatives (one equal and several unequal allocations).

From a strategic perspective, introducing discussion should not affect the equality of voting outcomes in pairwise voting, when there are only two alternatives. Because the choice between two alternatives is strategically uncomplicated, communication will not solve coordination or informational problems as in many voting games (Martinelli and Palfrey, 2020). In addition, since the options are exogenously given, communication does not influence proposals as in other majoritarian decision-making settings (e.g., Agranov and Tergiman, 2019).

We suggest instead that public communication may have two kinds of psychological effects. First, it may elicit or clarify social norms about appropriate behavior in a given context, similar to communication inducing cooperative behavior in social dilemmas (Bicchieri and Lev-On, 2007). Second, it may enhance social preferences, as in Charness and Dufwenberg (2006). For example, voters may underestimate their social preferences when thinking about them in terms of individual cognition. However, when they interact with others in a group, public communication may activate processes of social cognition, increasing the salience of social preferences or the connection between emotion and cognition. Either process would increase the salience of inequity aversion.

To illustrate, consider the choice between an equal allocation (y, y, y, y, y) and an unequal allocation (x, x, x, z, z), where $x > y > z$. If members care only about their own individual payoff, then a majority will vote for the unequal allocation. Alternatively, and more generally, we assume that members have social preferences, as in the model of Fehr and Schmidt (1999). An individual i's degree of inequity aversion is characterized by a parameter β_i and the utility for an allocation depends on their own payoff x_i and the differences between their own payoff and others' payoffs x_j, $j \neq i$:

$$u_i(x) = x_i - \beta_i \sum_{j \neq i} \frac{|x_i - x_j|}{n-1} \ . \quad (1)$$

Given such preferences, voters assigned to the high payoff x in the unequal allocation will vote for the unequal allocation if their inequity aversion is sufficiently low ($\beta_i < \frac{2x-2y}{x-z}$) and for the equal allocation if their inequity aversion is sufficiently

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Table 1. Examples of choice sets introducing coordination problems

Symmetric Majorities (Weak Stability)					
	Red	Green	Blue	Yellow	Gray
Option A	30	30	30	10	10
Option B	10	30	30	30	10
Option C	10	10	30	30	30
Option D	30	10	10	30	30
Option E	30	30	10	10	30
Option F	20	20	20	20	20
Asymmetric Majorities (Strong Instability)					
	Red	Green	Blue	Yellow	Gray
Option G	34	28	28	10	10
Option H	10	34	28	28	10
Option I	10	10	34	28	28
Option J	28	10	10	34	28
Option K	28	28	10	10	34
Option L	20	20	20	20	20

high ($\beta_i > \frac{2x-2y}{x-z}$). Our argument is premised on the notion that an individual's degree of inequity aversion β_i is situational, rather than a fixed trait. The effect of discussion is to increase the salience of inequity aversion, thereby effectively generating a behavioral increase in β_i.

Hypothesis 1 (Communication with pairwise alternatives). *If public discussion increases the salience of social norms or other-regarding preferences, we will observe (a) an increase in the likelihood that individuals vote for the equal allocation and (b) an increase in the likelihood that the equal allocation is chosen by the group.*

Next, we turn to collective choice environments with more than two alternatives. We focus on scenarios in which groups might vote for equal allocations for reasons other than social preferences. Specifically, we construct settings in which choosing unequal outcomes is difficult due to coordination problems. Examples of such choice sets are shown in Table 1, with letters indicating alternatives and colors identifying players, for symmetric majorities (top) and asymmetric majorities (bottom). For example, in the symmetric case, the Red player could coordinate with Green and Blue to obtain alternative A and receive the higher (majority) share, with Yellow and Gray to obtain D, or with Green and Gray to obtain E. Similarly, Blue need not coordinate with Red to obtain A but could also coordinate with Green and Yellow on B, or with Yellow and Gray on C.

In a simultaneous one-shot voting game in which an alternative is selected only if it receives majority support and players receive a payoff of zero otherwise, there are

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multiple equilibria, both with and without majority coordination. Given this multiplicity of equilibria, we expect that groups will have trouble coordinating on an unequal outcome if they cannot communicate. The singular equal allocation then becomes a focal point, which helps groups to avoid a failed decision and a zero payoffs outcome. On the other hand, with communication, potential majorities can overcome this coordination problem.

Hypothesis 2 (Coordination). *When faced with multiple unequal alternatives and a coordination problem, we expect (a) majorities to choose the equal (focal) allocation without communication and (b) for majorities to be more likely to select unequal allocations with communication.*

Our final hypothesis concerns the stability of majority coalitions. When unequal majority allocations are symmetric, every unequal allocation is undominated, because there is no allocation that is strictly preferred to it by a majority. However, because every unequal allocation is majority-preferred to the equal allocation (assuming material self-interest), the equal allocation is a Condorcet loser. Thus, every unequal allocation is in the core and *weak stability* characterizes majority rule when unequal allocations are symmetric.

By contrast, when majority allocations are asymmetric, the core does not exist. Every unequal allocation can be majority defeated by some other unequal allocation. Indeed, there is a voting cycle over all of the unequal allocations in the example in the lower part of Table 1. Thus, *strong instability* describes situations with unequal allocations. The relative instability of majority coalitions leads to our expectation that, when communication is allowed, the likelihood of unequal outcomes depends on the symmetry of majority allocations.

Hypothesis 3 (Stability). *With communication, unequal outcomes are more likely when majority allocations are symmetric (weak stability) than when they are asymmetric (strong instability).*

Experimental procedures

We ran our experiment at the Pittsburgh Experimental Economics Laboratory (PEEL) and recruited participants from the laboratory's participant pool. Each participant took part in only one session. All interactions occurred through visually isolated computer terminals using the software z-Tree (Fischbacher, 2007). We ran four sessions with 15 participants and two with 10, for a total of 80 participants.

Table 2 summarizes the experimental design (with the full text of the instructions provided in the Appendix). The experiment had three parts: *Random Dictator* (10 rounds), *Pairwise Voting* (10 rounds), and *Coalition Voting* (16 rounds). In each round, we randomly assigned participants to groups of 5. Half of the sessions involved public communication (*Chat* treatment), in which participants could send messages via a free-form chat (public, within groups) before each majority vote in the Pairwise Voting and Coalition Voting rounds. In the other half of the sessions, participants were not able to communicate prior to voting (*No Chat* treatment). The Random Dictator rounds were identical across the two treatments and did not allow communication.

Table 2. Summary of experimental design

	Communication Treatment		Allocations Per Round	Rounds
	No Chat	Chat		
Part 1. Random Dictator	Communication not allowed		1 equal, 1 unequal	10
Part 2. Pairwise Voting	Communication not allowed	75 seconds free form public chat before each vote	1 equal, 1 unequal	10
Part 3. Coalition Voting			1 equal, 5 unequal	16
Sessions	3	3		
Subjects	40	40		
Groups	8	8		

We used *points* as our experimental currency. Each point was worth \$0.75 (USD). At the end of each session, we randomly selected one round to determine subjects' payments. In addition, participants received \$2 for completing the experiment and a \$5 show-up fee. Average earnings were \$24.64.

Part 1: random dictator

We designed Part 1 to elicit individual measures of participants' social preferences, absent any strategic considerations. In each round, each participant made a choice between an *equal* allocation and an *unequal* majority allocation. Equal allocations gave each group member the same payoff of y_t in round t. Unequal allocations gave higher payoffs to members of the majority ($w_t > y_t$ to one member and $x_t > y_t$ to two members) and lower payoffs to members of the minority ($z_t < y_t$). In *symmetric* allocations, $w_t = x_t$, while in *asymmetric* allocations $w_t > x_t$.

In every round, each participant was assigned the majority payoff x_t for the unequal allocations. That is, a participant's allocation choice always yielded an individual payoff of x_t or y_t such that they were advantaged by the unequal payoff. We varied the payoffs across rounds t so that we could estimate each subject's degree of aversion to advantageous inequality (Fehr and Schmidt, 1999). We also varied whether the equal allocation was socially efficient or inefficient relative to the unequal allocation. (Appendix Table A1 lists the specific payoff values for each round of Part 1.)

Each group member's decision was equally likely to be selected for the purpose of calculating payments. Other group members were then randomly assigned to receive the remaining payoffs. Communication was not allowed, and participants did not learn about each others' choices or payoffs from Part 1 until the end of the experiment.

Part 2: pairwise voting

In Part 2, we introduce a pairwise voting mechanism to investigate the effect of communication, absent coalition, coordination, or other strategic incentives. Group

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members again faced a choice between an equal allocation and a majority allocation, but the final allocation was decided by a simultaneous majority vote without abstentions.

Before each round, each member of a group was randomly assigned to a specific payoff in the unequal allocation (w_t, x_t, or z_t). Thus, each participant knew whether they would be advantaged or disadvantaged by the unequal outcome prior to voting. (Appendix Table A2 lists the specific payoff values for each round of Part 2.) In the *No Chat* treatment, participants could not communicate. In the *Chat* treatment, participants could chat for 75 s via a free-form public chat window. Otherwise, participants did not receive feedback about individual votes or outcomes.

Part 3: coalition voting

In Part 3, we introduced a coordination problem by increasing the number of unequal allocations to five. Every unequal allocation in the round had the same payoff values of w_t, x_t, and z_t. However, we varied the assignment of payoffs so that each unequal allocation featured a different set of members receiving the higher payoffs. Specifically, each member received a higher payoff for three allocations and the lowest payoff for two allocations (as in the examples in Table 1). We also varied the asymmetry of majority payoffs to create majority rule instability and exacerbate the coordination problem: in rounds with asymmetric allocations, each member was assigned to the highest payoff w_t for exactly one allocation. (See Table A3 in the Appendix for the payoff values used in each round of Part 3.)

Decisions were again made by a simultaneous majority vote without abstentions. If no allocation received a majority, the computer displayed the number of votes each alternative received, without revealing individual votes, and a second vote was held. If no allocation received a majority on the second vote, all participants received 0 points for that round.

We took several steps to ensure the coordination problem was difficult, by preventing group members from using environmental cues or labels to coordinate. First, we assigned each group member a color to prevent members from forming coalitions using numerical patterns such as 1–2–3. Second, we randomly assigned letters to the alternatives in each round to prevent coordinating on a specific label. Third, we varied the order of the rows and columns for every player within the round. We did this to prevent players from using the position of the alternatives as a coordination device (e.g., if each player chose the top-most alternative that appeared on their screen, each alternative would receive exactly one vote). The difficulty of the coordination problem ensures that the equal allocation is focal in our design.[1]

Results

Inequity aversion

We first describe the degree of inequity aversion among the participants in our study as measured by their choices in the *Random Dictator* task. These measures of individual preferences are important because they inform our baseline expectations

[1]An interesting direction for future work would be to consider an alternative design in which inequality is focal, such as by having five nearly equal allocations and one more unequal allocation.

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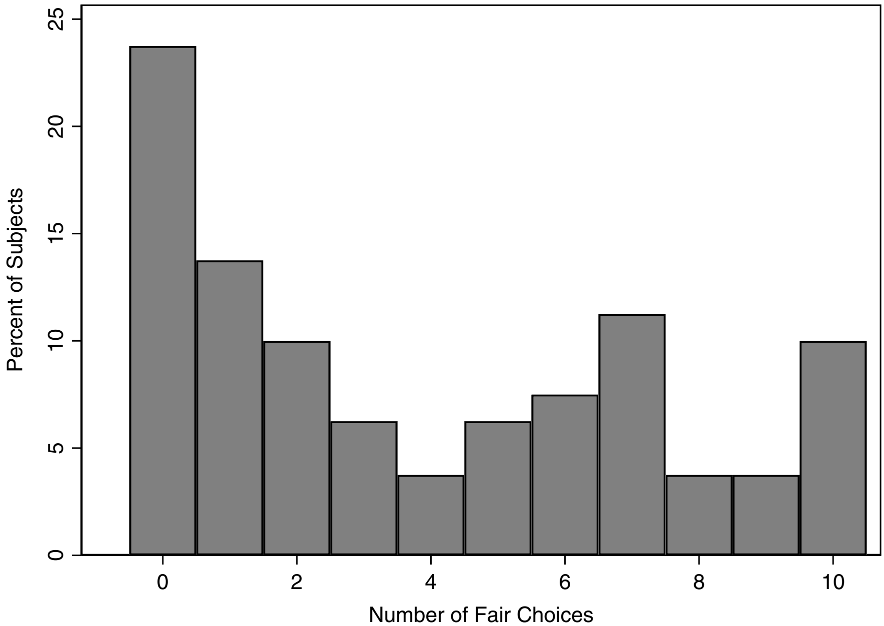

Figure 1. Participant distribution of equal choices.

about the equality of majority rule outcomes absent communication. If voters are purely self-interested utility maximizers, majority rule will generate unequal outcomes in our experiment. Alternatively, if voters are inequity averse, then majority rule will generally lead to equal outcomes and produce unequal outcomes only if the level of inequality (the difference between x_t and z_t) is not too great.

Figure 1 shows a histogram of the number of equal choices made by participants in Part 1. There is a noticeable degree of inequity aversion, with participants choosing the equal allocation 38.6% of the time. At the extremes, 23.8% of participants never choose the equal allocation and could be characterized as self-interested utility maximizers, while 10.0% always choose the equal outcome and are highly fairness-minded.

These results are consistent with the experimental literature on social preferences. Applying the Fehr and Schmidt (1999) model to participants' choices (see Section A2 in the Appendix for further details), we estimate that $\beta > 0.4$ for between 42.5% and 53.8% of participants in our sample. For comparison, Fehr and Schmidt (1999) estimate 40% of their participants to have $\beta = 0.6$, while Blanco et al. (2011) estimate 56% of their participants to have $\beta \geq 0.5$. We conclude that our participants are not exclusively self-interested, exhibiting sufficient inequity aversion such that we expect majority rule to generate a non-trivial amount of equal outcomes in the baseline *No Chat, Pairwise Voting* condition.

Communication and pairwise voting

Table 3 compares the choices of equal allocations for individuals and groups by communication treatment and decision mechanism. The first row shows the

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Table 3. Fairness in voting behavior and majority decisions

	Individual Votes				Group Decisions			
	No Chat	Chat	$p < 0.05$	*N*	No Chat	Chat	$\boldsymbol{p} < \mathbf{0.05}$	*N*
Dictator (Part 1)	39.5%	37.8%		800				
Pairwise (Part 2)	66.3%	79.0%	*	800	80.0%	86.3%		160
Majority	44.6%	66.7%	*	480				
Minority	98.8%	97.5%		320				
Coalition (Part 3)	73.6%	71.7%		1,445	99.2%	71.9%	*	256
Symmetric	71.8%	70.2%		725	98.4%	71.9%	*	128
Asymmetric	75.4%	73.2%		720	100.0%	71.9%	*	128
First ballot	70.0%	71.4%		1,280	100.0%	71.4%	*	223
Second ballot	88.4%	90.0%		146	96.8%	100.0%		33

percentage of group members who selected the equal allocation in the *Random Dictator* stage. Because there was no difference between the *No Chat* and *Chat* treatments at this stage, we do not observe any significant difference in the percentages of members who chose the equal allocation (39.5% in the *No Chat* vs. 37.8% in the *Chat* treatment).

In the *Pairwise Voting* rounds, we observe a significantly higher proportion of individuals who would benefit from inequality (members assigned to the higher majority payoff) voting for the equal allocation in the *Chat* treatment (66.7%) than in the *No Chat* treatment (44.6%, $p < 0.01$, difference in proportions, one-tailed test). The result suggests that public discussion has a behavioral effect increasing the salience of inequity aversion. There is also a modest increase in the proportion of groups choosing the equal outcome (86.3% in *Chat* versus 80.0% in *No Chat*) treatment. However, this difference is not statistically significant ($p = 0.146$, difference in proportions, one-tailed test). These results (and the additional regression analysis reported in Appendix A3) lend support for Hypothesis 1(a) but not for 1(b).

Given the high rate at which groups choose equal outcomes without communication, the group decision result may reflect a ceiling effect. Because members of the minority (those assigned the lower payoffs for unequal allocations) almost always vote for the equal allocation (consistent with both pure self-interest and inequity aversion), every member assigned the higher majority share is pivotal. It only requires one out of three majority share members to choose the equal allocation to change the outcome.[2]

Communication and coalition voting

In contrast to the *Pairwise Voting* rounds, discussion does not seem to affect individual voting behavior when there are multiple alternatives. In the *Coalition*

[2]Indeed, given that 44.6% receiving the higher share choose equal outcomes in *No Chat*, the expected likelihood that groups choose the equal outcome is $1 - 0.55^3 \approx 0.83$. In *Chat*, given the individual likelihood increases to 66%, the expected group likelihood increases to $1 - 0.33^3 \approx 0.96$.

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Table 4. Content of messages in chat treatment

Characteristic	Pct.
Option (Letter)	60.8%
Player ID (Color)	6.5%
Fairness	3.3%
Payoff differences	1.7%
Maximization	1.0%
Majority	0.3%
Total Messages	2,160

Voting rounds, 73.6% of individual votes are for the equal allocation in the *No Chat* treatment, and 71.7% in the *Chat* treatment. The difference is not statistically significant. However, the rate at which groups vote for the equal allocation in the *No Chat*, *Coalition Voting* rounds is much higher than we would predict based on their members' *Random Dictator* choices. This is consistent with Hypothesis 2(a), suggesting that we successfully introduced a difficult coordination problem and that the focality of the equal allocation helps to solve it.

We find that communication significantly reduces the equality of group outcomes in the *Chat, Coalition Voting* rounds. Groups choose the equal allocation 99.2% of the time without communication and 71.9% of the time with communication, consistent with Hypothesis 1(b) ($p < 0.01$, difference of proportions test, one-tailed). The fact that group decisions change significantly while aggregate individual behavior does not (which is supported by the regression analysis in Appendix A3) strongly suggests that communication has a coordination effect. The difference in the equality of group decisions on the first and second ballots in the *Chat* treatment further supports this conclusion, as 71.4% of the groups that make a majority decision on the first ballot choose the equal outcome while 100% of groups that fail to make an initial decision subsequently choose the equal outcome on the second ballot.[3]

As Table 3 shows, we find no effect of majority rule instability when communication is allowed. Groups choose equal allocations at the same rate in the *No Chat* treatment regardless of whether majority allocations are symmetric or asymmetric (71.9% for both types of allocations). Thus, we find no support for Hypothesis 3. These results are consistent with Fiorina and Plott (1978) and Sauermann (2016), who report similar findings that an empty core has little to no effect on stability.

Analyzing the content of participants' chat messages suggests that group members use communication instrumentally, to state their preferred allocation or intended action. Table 4 summarizes our content analysis (pooling all messages in

[3]We also find that communication reduces the time it takes to reach a majority decision. In the *No Chat* treatment, only 76% of decisions were made on the first ballot. This increased to 98% of decisions in the *Chat* treatment.

the *Pairwise Voting* and *Coalition Voting* rounds).[4] Strikingly, the vast majority of messages (60.8%) consist of a single character referring to one of the allocations (e.g., A, B, C, etc.) in the group's choice set. Messages that are directed at other group members (e.g., the Yellow player writes a message referencing only the Gray and Red players) are a distant second (6.5%). Only a tiny fraction of messages refer to any kind of principle or decision criterion, whether related to fairness, maximization, or forming majorities. We also found that participants communicated more in the *Coalition Voting* than in the *Pairwise Voting* treatment, which is consistent with the difficulty of the coordination problem. Overall, these results support the interpretation that communication was used to undermine fairness by helping majorities coordinate on unequal outcomes.

Conclusion

Becky Morton was a pioneer, advocate, and mentor in the field of experimental political economy, a tradition our experiment continues. That is, we explore substantive questions in political science using tools from experimental economics (Morton, 2014), linking theory and experiment (Morton, 1999). Examining human behavior in a controlled lab environment allows us to establish causal relationships and to uncover the underpinnings of political behavior and their implications for the choices that actors make under various circumstances (Morton and Williams, 2010, 10–11).

In our experiment, we find that participants use majority rule to vote for equal allocations, despite the prediction of rational choice theory based on pure self-interest to the contrary. We also find that in majority rule settings, communication has both a bright and dark side. When the choice between self-interested and egalitarian alternatives is especially stark and there is no strategic complexity, communication increases the likelihood that participants vote for equal allocations (but not enough to increase the fairness of outcomes). On the other hand, when there is strategic complexity and a coordination problem, participants use communication to coordinate majority coalitions, increasing the likelihood of unequal outcomes. Our study therefore continues Morton's work of addressing the connections between majority rule, fairness, and equality of outcomes (Diermeier and Morton, 2005; Battaglini et al., 2007; Morton and Ou, 2019), between public communication and voting (Kittel et al., 2014), and advancing an inclusive vision of experimental political science (Morton and Williams, 2010, 381–383).

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/XPS.2023.29

Data availability statement. The data, code, and any additional materials required to replicate all analyses in this article are available at the Journal of Experimental Political Science Dataverse within the Harvard Dataverse Network, at: doi.org/10.7910/DVN/JJ0DQF (Woon et al., 2023).

[4]We conducted our content analysis by searching for keywords and then hand-coding the remaining messages. We used the following keywords to indicate preference for equality: fair, common, equal, and even, and the following keywords for utility maximization: max, more, and most. For payoff differences, we used only, difference, disparity, and gap. Messages were coded by the experimenters. For further details, including samples of group chats, see Appendix A4.

Competing interests. The authors have no conflicts of interest to disclose.

Ethics statement. This research study was approved by University of Pittsburgh IRB (protocol number: PRO18030467) and adheres to APSA's Principles and Guidance for Human Subjects Research.

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