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Title:
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Date:
2025-09-01

Citation:
Alós-Ferrer, C., Garagnani, M. & García-Segarra, J. (2025). The framing of elections: cooperation vs. competition. Social Choice and Welfare, 65 (2), pp.363-385. https://doi.org/10.1007/s00355-024-01580-9.

Persistent Link:
https://hdl.handle.net/11343/362105

Social Choice and Welfare (2025) 65:363–385
https://doi.org/10.1007/s00355-024-01580-9

ORIGINAL PAPER

The framing of elections: cooperation vs. competition

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Received: 9 May 2024 / Accepted: 20 December 2024 / Published online: 20 January 2025

Abstract

We show that framing an election as a "competition" compared to "cooperation" reduces the chances that egalitarian alternatives will win under Plurality Voting, but not under Approval Voting. Individual voting behavior shows that the effect is mainly driven by voters who switch to their selfishly payoff-maximizing alternatives under a competitive framework, but only when those are also payoff-efficient (in terms of sum of payoffs for the group). This shift does not happen for voters whose payoff-maximizing alternatives are not payoff-efficient, or even if a majority of voters are better off under the payoff-efficient alternative. This suggests that voters are more likely to switch to selfish payoff-maximizing alternatives under a competitive frame if they can (self-)justify the switch in terms of the common good.

1 Introduction

Many decisions are made through voting, from small committees and corporate boards to large elections in democratic societies. In many cases, the conflicts arising between different groups (parties, interest groups, socioeconomic classes, etc.) might induce a competitive "us vs. them" frame which affects how voters view the voting decision. A large literature in economics and psychology has shown that framing often has predictable effects on individual decision making (Tversky and Kahneman 1981; Tversky et al. 1988; Quattrone and Tversky 1988). In particular, cooperative frames have been shown to affect behavior in the prisoner's dilemma (Liberman et al. 2004; Zhong et al. 2007). Hence, in this work we ask whether a competitive frame (compared to a more cooperative one) influences voting behavior and electoral outcomes. We focus on situations where a cooperative (egalitarian) alternative is available, but voter groups could support selfish (group-)payoff-maximizing options instead.

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To investigate this question, we carried out a laboratory experiment following standard experimental designs (Forsythe et al. 1993; Granić 2017; Alós-Ferrer and Garagnani 2022), but framing the elections either in terms of a cooperative decision or a competitive one. Compared to field data, the laboratory setting allows us to exert more control over the variables of interest, and in particular the framing. Preferences over alternatives are induced through monetary payoffs, and hence we can design alternatives reflecting our research question, and in particular ensure that there is a conflict between an egalitarian potential outcome and the selfish payoff-maximizing alternatives preferred by several groups.

Our framing manipulation was minimal. In one treatment, experimental participants were described as "cooperators" in the instructions, while in the other treatment they were referred to as "competitors." Participants made decisions in small experimental societies composed of three groups characterized by different preferences, but no other manipulation of group identity was used. We hypothesized that the salience of group identities should be higher in the competitive decision situation than under the cooperative description. Therefore, under competitive framing, we should see more support for selfish (ingroup) options and less support for the egalitarian alternative compared to the cooperative treatment.

We considered two different voting procedures. The first, Plurality Voting (PV), underlies the most commonly-used voting methods in Western societies. Voters are asked to provide only the maxima of their preferences, disregarding all other information, and the alternative with the most votes wins. Well-known theoretical results show that, as is the case for most voting methods, under PV voters have incentives to misrepresent preferences for strategic reasons (Gibbard 1973; Satterthwaite 1975), and empirical evidence indeed suggests that strategic voting is widespread in political elections based on PV and its variants (Black 1978; Alvarez and Nagler 2000; Fisher 2004; Eggers and Vivyan 2020). In particular, strategic considerations lead to the well-known "wasted-vote effect," where voters avoid supporting their actually-preferred candidates if they believe they are unlikely to win, and shift support to popular ones instead (Riker 1982; Banducci and Karp 2009). Our general hypothesis is that framing the voting decision in terms of competition (as opposed to cooperation) should affect strategic behavior if incentives to misrepresent preferences are present, and hence have an effect on actual voting behavior and electoral outcomes.

The voting literature has frequently argued that incentives to misrepresent preferences are widespread because, in most methods, voters can only express their preferences in a very narrow way (Balinski and Laraki 2020; Lachat and Laslier 2024). Hence, our experiment also included a second voting method which sits at the opposite end of the spectrum from Plurality Voting in this particular dimension. This method is Approval Voting (AV; Brams and Fishburn 1978), which allows voters to "approve of" as many alternatives as they wish, and selects the one with the most approvals as winner. The theoretical advantages of AV have been shown in axiomatic characterizations (Fishburn 1978, 1979; Alós-Ferrer 2006; Xu 2010; Brandl and Peters 2022), but a key advantage for our purposes is its (non-)manipulability. Specifically, Brams and Fishburn (1978) showed that Approval Voting is non-manipulable under two mild conditions on the extension of preferences to sets of candidates. More recently, Alós-Ferrer and Buckenmaier (2019) showed that, under AV, voters always have a best response ballot such that every approved candidate is strictly preferred to every disapproved one, given other voters' ballots. Intuitively, results as those reflect the fact that, under AV, voters have more room to express their preferences (by means of approving of more alternatives) and face no strategic tradeoffs (supporting one alternative does not imply withdrawing support from another), which makes the method less vulnerable to strategic voting. In particular, the wasted-vote argument is entirely absent under AV, since there is no reason not to approve of a favorite candidate even if voters decide to also approve of another one which is more likely to win. Hence, our hypothesis was that AV would be less susceptible to changes in voting behavior due to framing than PV.

The empirical performance of the AV method has been investigated in large-scale field experiments during actual elections (Laslier and Van der Straeten 2004, 2008; Alós-Ferrer and Granić 2012, 2015; Baujard et al. 2014), as well as in laboratory experiments (Laslier 2010; Van der Straeten et al. 2010; Bassi 2015; Granić 2017). Several studies have reported the robustness of the AV method (in comparison to PV) in different contexts. For instance, AV might reduce biases toward one's own group to the detriment of others (parochialism) (Baron et al. 2005) and facilitate the selection of compromises (Alós-Ferrer and Buckenmaier 2021). In relation to framing, a recent study (Alós-Ferrer et al. 2021) found that voting behavior under PV is affected by a framing manipulation in terms of whether the payoffs are expressed as gains or losses, but AV is less affected by this frame. Similarly, Alós-Ferrer and Garagnani (2022) found that voting behavior under PV is influenced by time pressure, but AV is more robust to this manipulation.

An additional motivation for the experimental study of Approval Voting is that, contrary to most other methods, AV is not a social choice function but rather a ballot aggregation function. That is, it does not aggregate voters' preferences but rather their choices (this is the reason that the manipulability result of Gibbard 1973 and Satterthwaite 1975 does not apply to AV). Thus, voters' preferences, e.g. as experimentally induced in the laboratory, do not allow to predict voters' approval ballots. This is because, even under sincere voting, a voter could approve of her most-preferred alternative only, or the two most-preferred ones, or the five most-preferred ones. Hence, even if one would be willing to assume specific voting behavior patterns, the actual performance of AV would remain an empirical question.

In alignment with our hypotheses, we find that a competitive frame, compared to a cooperative one, shifts voter support in PV away from egalitarian alternatives and toward selfish, payoff-maximizing ones, and this shift is strong enough to induce a significant difference in electoral outcomes. This effect, however, is absent for AV. We also find evidence that egalitarian alternatives are more supported under AV compared to PV.

Our experimental design created qualitatively different groups, and we use this feature to investigate the individual determinants underlying the effect on voting outcomes. We find that the shift in voter support under PV comes mainly from voters whose payoff-maximizing option is also payoff-efficient, i.e., increases aggregate payoffs for the entire society. Crucially, the shift is not significant for voters whose payoff-maximizing alternative differs from the payoff-efficient one, even if the latter increases their own payoffs compared to the egalitarian outcome. Also, those voters do not significantly shift support to the payoff-efficient alternative either. This strongly suggests that a competitive frame induces voters to shift support from egalitarian alternatives towards more selfish ones, but only if they can (self-)justify this shift on the grounds that the selfish alternative benefits the common good in terms of aggregate payoffs.

Our contribution is also related to a strand of the literature which has empirically demonstrated that other-regarding motives as equity or efficiency have an impact on voting behavior (Feddersen et al. 2009; Shayo and Harel 2012; Morton and Ou 2019). Our focus, however, is on how cooperative vs. competitive frames influence behavior in the presence of equity and efficiency considerations. Also, and although our focus is different, our work is related to the literature on ingroup bias, which has shown that framing decisions in terms of ingroups vs. outgroups ("us vs. them") can systematically affect behavior. Specifically, people are willing to incur personal costs to help the ingroup and also to hurt the outgroup (Brewer 1999; Klor and Shayo 2010; Halevy et al. 2012; Greenwald and Pettigrew 2014; Yamagishi and Mifune 2016). Interestingly, as mentioned above, AV has been shown to reduce ingroup bias (parochialism Baron et al. 2005).

The article is structured as follows. Section 2 presents the experimental societies and the experimental design and procedures. Section 3 presents the results, distinguishing effects on electoral outcomes and individual voting behavior. Section 4 concludes. The appendix contains the (translated) experimental instructions and sample screenshots.

2 Experimental design

We recruited 144 participants (69 females) in a 2 within (voting method: PV vs. AV) $\times$ 2 between (framing manipulation: Cooperative vs. Competitive) design. The experiment was conducted in three separate sessions (48 participants each) at the "Laboratori d'Economia Experimental" (LEE) in the Universitat Jaume I de Castelló de la Plana (Spain) using z-Tree (Fischbacher 2007). Participants were recruited using the LEE proprietary recruitment system. Two participants were excluded from the analysis of individual behavior due to failure to understand the instructions, and two further because they failed to obey the rules of the lab regarding smartphone use during the experiment. The results are qualitatively unaffected if their decisions are included in the analysis. For the analysis of electoral outcomes, however, we do not exclude any observations, as doing so would force us to either exclude entire voting groups or artificially consider five-voter groups when decisions were actually made for six-voter societies.

2.1 The experimental societies

The experimental design is based on standard implementations of voting games, as e.g., in Forsythe et al. (1993), Granić (2017), or Alós-Ferrer and Garagnani (2022). Preferences over alternatives were induced using monetary incentives in the form of payoff tables displaying the rewards from different election outcomes (see right-hand

Table 1 Experimental societies (preference profiles)

Voter type	Number	Induced preferences	A	B	C	D	Total
Society 1							
Type 1	2	$A \succ C \succ D \succ B$	80	30	60	55	225
Type 2	2	$B \succ C \succ D \succ A$	20	90	60	55	225
Type 3	2	$D \succ C \succ A \succ B$	55	30	60	80	225
Total			155	150	180	190	
Society 2							
Type 1	2	$A \succ D \succ C \succ B$	80	30	55	60	225
Type 2	2	$B \succ C \succ D \succ A$	30	90	55	50	225
Type 3	2	$D \succ A \succ C \succ B$	60	30	55	80	225
Total			170	150	165	190	

side of Table 1). Payoffs were given as Experimental Currency Units (ECUs), which were converted at a rate of EUR 0.20 per ECU at the end of the experiment.

In each framing treatment, participants voted in two different *Societies* represented by different payoff tables. The two societies used in the experiment are presented in Table 1. In each society, there were four available alternatives and three types (groups) of voters (preferences), with two voters of each type.

Both societies put selfish, payoff-maximizing options against more cooperative ones which benefit most voters. Specifically, in both societies, there is an egalitarian option (C) which is not payoff-maximizing for any type. Types 1 and 2 have selfish payoff-maximizing options (A and B, respectively), while the payoff-maximizing option of Type 3 (D) is efficient in terms of aggregate payoffs for the entire society. The difference between societies is that in Society 1, the socially-efficient alternative benefits only a minority compared with the egalitarian outcome, while in Society 2 it favors a majority. An important observation is that, in both societies, Type 3 is the only type that could justify going for its own selfish, payoff-maximizing alternative with a common-good argument (efficiency).

In detail, in Society 1, alternatives A and B maximize the individual payoffs for voters of Types 1 and 2, respectively, but induce respective low payoffs for one or two of the other types. In contrast, alternative C leads to an egalitarian outcome, where every voter receives the same payoff. Further, the sum of payoffs under C exceeds the sum of payoffs under either A or B. Hence, for Types 1 and 2, there is a clear tradeoff betwen selfish payoff-maximization and the common good.

However, for Type 3, and to distinguish different possible motives (equality vs. efficiency), individual payoffs are maximized by alternative D, which also leads to the highest sum of payoffs (hence efficiency in this sense) but lower payoffs than C for both of the other two types. This socially-efficient alternative D hence creates inequality and divides the electorate into two groups. Voters of Type 3 are *Efficiency Winners* (EW), as they would obtain more than the equal split if the socially-efficient alternative D were implemented. Types 1 and 2 are *Efficiency Losers* (EL), as they would receive less than the equal split in that case.

The main purpose of Society 2 is to reproduce the structure of Society 1 while having a majority of Efficiency Winners. Again, alternatives A and B are payoff-maximizing for types 1 and 2, respectively, while leading to low payoffs for one or two of the other types. Also, alternative C remains egalitarian, and alternative D is both payoff-efficient and payoff-maximizing for Type 3. However, contrary to Society 1, voters of Type 1 prefer D to C and are hence also Efficiency Winners (as Type 3) in this society.

2.2 Experimental procedures

Ballots were displayed on the screen, and voters could decide their choices anonymously. In each election, participants saw the entire payoff table. That is, they knew the payoff and the induced preferences of all voters. Under PV, voters had to choose one alternative only, and the winner was determined by the number of votes received. In contrast, under AV, voters could choose (approve of) as many alternatives as wished per ballot. The election winner was the alternative with the highest number of approvals. Ties between two or more alternatives were broken randomly. Abstention (empty ballots) was not allowed. However, under AV one could interpret approving of all alternatives as an abstention. This only happened 25 times in our entire dataset, (2.98% of all 140×6 AV individual-behavior observations).

Participants were randomly allocated to different blocks of six voters each, which were fixed for the entire experiment. However, there was no interaction within the block, as voting decisions were made individually and no feedback on voting outcomes was given until the end of the experiment. For half of the blocks, elections were framed in terms of cooperation, specifically referring to voters as "cooperators." For the other half, they were framed in terms of "competitors" voting to implement an alternative. The framing of the election started with the general instructions at the beginning of the study and was present on each voting screen during the entire experiment.

Each participant faced twelve voting rounds, corresponding to all combinations of voting methods (PV vs. AV), society, and type of voter. That is, every voter made decisions for every Type in every payoff table and every voting method (in different voting rounds). Specifically, participants first made six decisions under a voting method before switching to the other voting method for the remaining six decisions. The order of methods was counterbalanced, with half of the blocks (in each treatment) starting with PV and switching to AV after six voting rounds, and conversely for the other half. The order of types and societies was randomized. For each voting method and for each participant, in each round the participant was assigned to one of three types in one of the societies. Payoffs were jittered every round, so that the preference profiles were fixed for a given society, but the actual numerical payoffs varied. Each round, participants were simply given the corresponding payoff table and told their type.

Experimental sessions lasted around 50 min including instructions and payment. At the end of the experiment, for each block of voters, one of the twelve rounds was randomly selected and implemented, and payoffs were the ones derived from the corresponding outcome. The average payoff was EUR 12.01 (median 12.00), ranging from EUR 4 to EUR 18.

Election outcomes were not announced until the end of the experiment to avoid learning, feedback, and repeated-game effects. Thus, at the end of each round, participants went directly to the next round without knowing the previous round's outcome. We implemented this procedure because Esponda and Vespa (2014) shows that strategic voting increases when feedback is provided in a laboratory voting game. Hence, to elicit the voters' support for each alternative (i.e., one-shot voting behavior) as cleanly as possible and isolate the effect of framing on the voting decision, we deliberately refrained from providing feedback after each election.

2.3 Power

The minimum required power for detecting a medium effect size ($d = 0.5$) with a random effect panel probit regression for a between-subject treatment (e.g., treatment effect) was set to 0.80, yielding a required sample size of $N = 60$ per condition according to the simulated values obtained following Bellemare et al. (2016). Since we obtained data from 140 individuals (70 in each condition) and we compared 144 elections per voting method, 72 in each treatment, the power of our study is sufficient to find a medium effect of the treatment manipulation on voting behavior or on electoral outcomes.

3 Results

Among the $N = 140$ participants included for individual behavior analysis, the median age was 22 (avg. 23.28, SD= 6.26), there were 71 women, and 61 of the participants were attending a university major related to economics (e.g., management, finance, marketing). The random assignment was successful in guaranteeing balanced groups between treatments.[1]

We are mainly interested in how framing affects the support for the cooperative (egalitarian) alternative C, as well as this alternative's success in terms of electoral outcomes. We will first present the analysis of electoral outcomes and then examine their origins by looking at individual behavior.

3.1 Electoral outcomes

We start with the overall effect of framing in the ultimate variable of interest, which is electoral outcomes. We had 288 elections in total. This corresponds to 144 elections per

[1] In the final $N = 140$ sample, there were 70 participants in each treatment. There were no statistically significant differences regarding age (cooperation treatment, average 23.89 years, Competition treatment 22.80 years; Mann–Whitney test, $N = 140$, $z = 0.778$, $p = 0.438$), gender (cooperation treatment 50.00% females, competition 48.57% females; test of proportions, $N = 140$, $z = 0.168$, $p = 1.000$), and major (cooperation treatment, 41.43% economics-related majors, competition 44.29%; test of proportions, $N = 140$, $z = -0.340$, $p = 0.865$). There were also no differences if the four excluded participants were included.

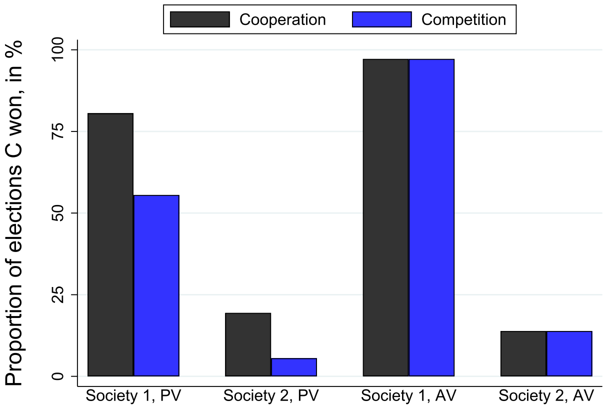

Fig. 1 Proportion of times alternative *C* won the election by treatment (cooperation vs. competition), society (Society 1 vs. Society 2), and voting method (PV vs. AV). See Table 2 for the statistical analysis

Table 2 Random effects panel probit regressions with clustered standard errors at the voting-block level (indexed by voting block and voting round) on the probability that the egalitarian alternative (*C*) or the efficient alternative (*D*) won the election, split by societies

Winner of the election	Alternative C		Alternative D	
	Society 1	Society 2	Society 1	Society 2
Competition	− 0.733**	− 0.732***	0.140	0.431*
	(0.295)	(0.203)	(0.335)	(0.257)
AV	1.066*	− 0.224	− 1.221***	0.431
	(0.557)	(0.434)	(0.282)	(0.495)
Comp. × AV	0.733	0.732**	− 0.004	− 0.618
	(0.608)	(0.340)	(0.363)	(0.587)
Constant	0.876***	− 0.862***	0.000	0.431
	(0.304)	(0.187)	(0.187)	(0.281)
Comp. + Comp. × AV	− 0.001	0.001	0.135	− 0.187
	(0.685)	(0.196)	(0.241)	(0.506)
AV + AV × Comp.	1.798***	0.508	− 1.225***	− 0.187
	(0.389)	(0.427)	(0.450)	(0.562)
Observations	144	144	144	144

Standard errors in parentheses, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

society. Within each society, there were 72 elections for each treatment (Cooperation vs. Competition). For each combination of society and voting method, there were 36 elections under Plurality Voting and 36 under Approval Voting. Figure 1 depicts the proportion of times that alternative *C* was a winner of the election by treatment, society, and voting method. Since a subject participated in more than one election, we test for differences in electoral outcomes using random effects probit panel regressions on the probability that a given won the election, which are reported in Table 2. The first two columns of this table investigate the probability of alternative C to win the election.

For Plurality Voting, as expected, the egalitarian alternative C won the election more often under the cooperative treatment than under the competitive treatment, both in Society 1 (80.56 vs. 55.56%) and in Society 2 (19.44 vs. 5.56%). The coefficient of the competitive frame dummy in the first model of Table 2 is negative and significant, confirming this result.

This effect, however, is absent for Approval Voting, that is, the egalitarian alternative did not win more often under the cooperative treatment for elections under AV. This is indicated by the linear combination test $Comp.+Comp.\times AV$, which is not significant. The differences between methods are indicated by the significant AV dummy, which shows that, in Society 1, the egalitarian alternative was more often selected under AV compared to PV in the cooperative frame, and the significant linear combination test $AV + Comp. \times AV$, which shows the same effect for the competitive frame.

The difference between methods is in alignment with previous observations that AV is more robust than PV to strategic behavior (Brams and Fishburn 1978, 2005; Wolitzky 2009; Alós-Ferrer and Buckenmaier 2019). It is also in alignment with recent results suggesting that AV is more robust to psychological manipulations, such as the framing of payoffs in terms of gains or losses (Alós-Ferrer et al. 2021), or time pressure for the voting decision (Alós-Ferrer and Garagnani 2022).

The last two columns of Table 2 report the analogous analysis for the payoff-efficient alternative D. This alternative was not significantly more likely to win the election under a competitive frame compared to a cooperative one, or under PV compared to AV. For Society 1, the payoff-efficient alternative was less likely to win under AV compared to PV, both in the cooperative and in the competitive frame.

3.2 Individual voting behavior

To uncover the individual-level effects underlying the aggregate effect on voting outcomes, we now turn to the analysis of individual voting behavior. Figure 2 depicts the proportion of votes or approvals for the egalitarian alternative C for each society, voting method, and voter type, comparing both frames. That is, each double-bar aggregates the proportion of votes or approvals for C across all participants, comparing the cooperative and the competitive frames. Figure 3 presents the analogous data for alternative D. For convenience, Fig. 4 shows the same data but aggregated across voter types. Table 5 in the Appendix shows the proportion of votes or approvals for each of the alternatives by voting method, treatment, Society, and voter type.

Since subjects participated in multiple elections, we summarize the main findings through random-effects probit panel regressions on the probability of voting for alternatives C or D, as reported in Tables 3 and 4, respectively. For convenience, the tables contain separate regressions for each of the voter types. The regressions control for the order of voting methods, gender, and field of studies (economics-related major).

3.2.1 Comparison of societies

Recall that, by design, in Society 1 the socially-efficient alternative D benefits only a minority compared with the egalitarian outcome C, while in Society 2 it favors a

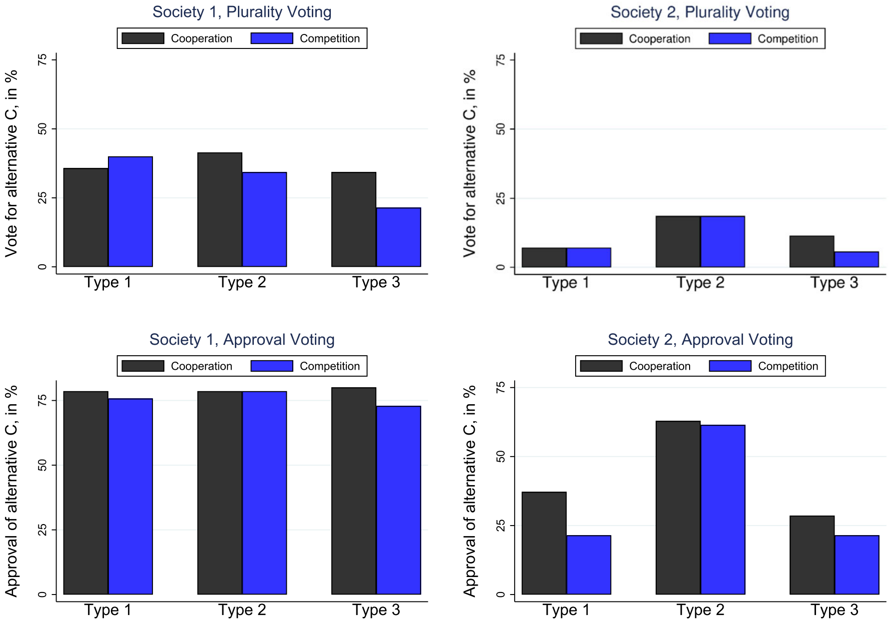

Fig. 2 Voters' support for the fair alternative C by treatment (cooperation vs. competition), society (Society 1 vs. Society 2), voting methods (PV vs. AV) and voters' types. See Table 3 for the statistical analysis

majority. We hence expected a smaller support for *C* in Society 2. Indeed, we observe that the coefficients for Society 2 in Table 3 are significantly negative for all voter types. This can also be seen in Fig. 2, which illustrates that the cooperative option was overwhelmingly more supported in Society 1 than in Society 2, across all frames and voting methods. Aggregating across types (Fig. 4, left), for PV and a cooperative frame, 37.14% of voters chose *C* in Society 1, vs. only 12.38% in Society 2. The comparison also holds for PV and a competitive frame (Society 1, 31.90%; Society 2, 10.48%), for AV and a cooperative frame (Society 1, 79.05% approvals; Society 2, 42.86%), and for AV and a competitive frame (Society 1, 75.71%; Society 2, 34.76%). Thus, we see that the two Societies are different in the expected direction, and in particular cooperation is less attractive in Society 2.

Table 4 presents the analogous regressions for the socially-efficient alternative *D*. In particular, it shows that this alternative, which favors a majority of Efficiency Winners in Society 2 but not in Society 1, received larger support in the former compared to the latter, across all voter types. This can also be seen in Fig. 3, which depicts support for the efficient alternative for both societies, across all frames and voting methods. Aggregating across types (Fig. 4, right), for PV and a cooperative frame, 24.76% of voters chose *D* in Society 1, vs. 35.71% in Society 2. The comparison also holds for PV and a competitive frame (Society 1, 30.00%; Society 2, 41.43%), for AV and a cooperative frame (Society 1, 45.71% approvals; Society 2, 67.62%), and for AV and a competitive frame (Society 1, 47.14%; Society 2, 62.86%).

Table 3 Random effects panel probit regressions on the probability of voting for (or approving of) the egalitarian alternative (C) across voters' types, with clustered standard errors at the individual level

Vote for option C	Type 1		Type 2		Type 3	
Competition	− 0.157	0.200	− 0.083	− 0.232	− 0.356**	− 0.473*
	(0.194)	(0.266)	(0.250)	(0.318)	(0.181)	(0.259)
Society 2	− 1.600***	− 1.469***	− 0.837***	− 0.894***	− 1.437***	− 1.414***
	(0.173)	(0.207)	(0.141)	(0.193)	(0.150)	(0.189)
Competition × Soc. 2		− 0.305		0.116		− 0.052
		(0.321)		(0.269)		(0.282)
AV	1.298***	1.514***	1.787***	1.704***	1.328***	1.220***
	(0.156)	(0.209)	(0.203)	(0.251)	(0.159)	(0.206)
Competition × AV		− 0.420		0.182		0.233
		(0.288)		(0.339)		(0.299)
AVBeforePV	0.155	0.160	− 0.181	− 0.187	0.235	0.234
	(0.196)	(0.198)	(0.257)	(0.259)	(0.178)	(0.178)
EconMajor	0.086	0.086	− 0.167	− 0.165	− 0.182	− 0.184
	(0.197)	(0.200)	(0.261)	(0.262)	(0.180)	(0.180)
Female	− 0.018	− 0.020	− 0.093	− 0.090	0.033	0.035
	(0.197)	(0.200)	(0.252)	(0.254)	(0.181)	(0.182)
Constant	− 0.395*	− 0.575**	− 0.262	− 0.191	− 0.461**	− 0.411*
	(0.226)	(0.251)	(0.294)	(0.312)	(0.213)	(0.229)
Comp. + Comp. × Soc.2		− 0.105		− 0.117		− 0.525
		(0.335)		(0.331)		(0.355)
Comp. + Comp. × AV		− 0.220		− 0.050		− 0.240
		(0.281)		(0.358)		(0.244)
Observations	560	560	560	560	560	560

Standard errors in parentheses, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

3.2.2 Comparison of voting methods

The support for C (and also the support for D) is larger for AV compared to PV across all types, as evidenced by the significantly positive coefficients for Approval Voting in the regressions (Tables 3 and 4). This can also be seen in Figs. 2, 3, and 4. However, this is mostly a mechanical effect, as, under AV, voting for an alternative does not detract from the possibility of voting for another, hence there are no strategic tradeoffs (Brams and Fishburn 1978).

3.2.3 Cooperation vs. competition

Our focus is on the treatment effects, i.e., the effects of cooperative vs. competitive framing. Recall that, in both societies, Type 3 is the only type that could use a common-good argument (supporting efficiency) to justify supporting its own selfish, payoff-maximizing alternative. We find that the coefficient of the competition treatment is

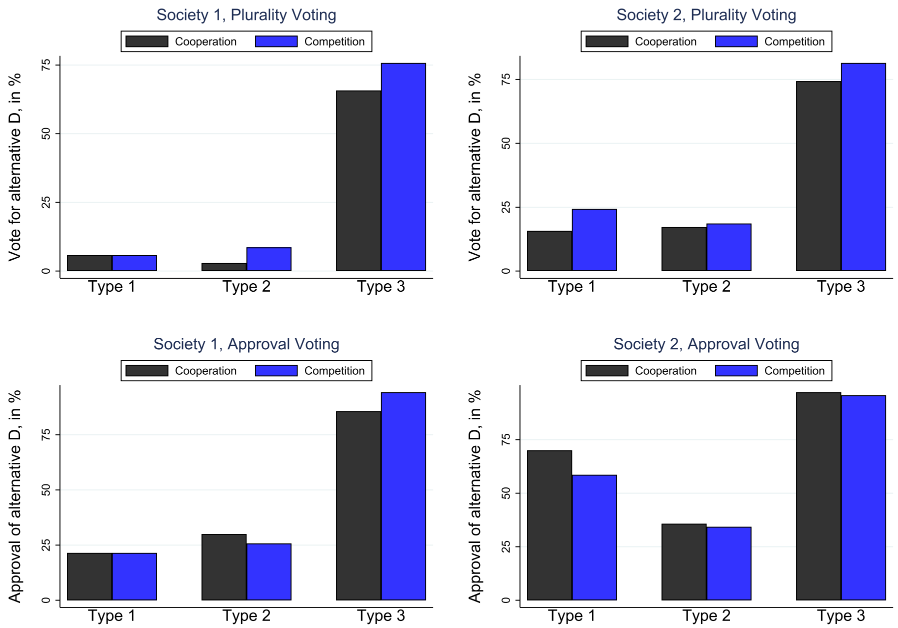

Fig. 3 Voters' support for the efficient alternative D by treatment (cooperation vs. competition), society (Society 1 vs. Society 2), voting methods (PV vs. AV) and voters' types

significant and negative for Type 3 voters in Table 3, showing that a competitive frame decreases the support for the egalitarian option (or, conversely, a cooperative frame increases it) for this type of voters. Specifically, in Society 1, voters of Type 3 voted less often for the cooperative option C in the competitive frame (21.43%) than in the cooperative frame (34.39%). A similar difference is observed for Society 2 (5.71% in the competitive frame compared to 11.43% of votes for C in the cooperative frame), but the linear combination test (bottom of the table) misses significance ($p = 0.108$). To better understand this effect, note that, for both societies, Type 3 voters voted more often for the efficient alternative D in the competitive frame than in the cooperative frame (PV: 75.71 vs. 65.71%; AV: 94.29 vs. 85.71%). That is, a fraction of Type 3 voters switched their support from C (in the cooperative frame) to D (in the competitive frame). However, this difference does not reach significance in the regressions in Table 4.

These effects are absent for voters of Types 1 and 2, in both societies. The picture that arises is the following. A competitive frame, compared to a cooperative one, shifts voter support away from egalitarian alternatives and toward selfish, payoff-maximizing ones, but only if voters have a "common-good" justification for this shift. By design, this corresponds to Type 3 voters. That is, Type 3 voters can justify (maybe implicitly and even unconsciously) switching to their payoff-maximizing alternative because it also favors the common-good in terms of aggregate payoffs. Type 1 and 2 voters could of course also prefer the efficient alternative to the egalitarian one due to this argument, but, for them, the efficient alternative is *not* payoff-maximizing. That is, the shift is due

Table 4 Random effects panel probit regressions on the probability of voting for (or approving of) the efficient alternative (D) across voters' types, with clustered standard errors at the individual level

Vote for option D	Type 1		Type 2		Type 3	
Competition	− 0.018	0.332	− 0.000	0.261	0.370	0.558
	(0.162)	(0.353)	(0.210)	(0.313)	(0.268)	(0.353)
Society 2	1.155***	1.216***	0.482***	0.517***	0.462**	0.621**
	(0.156)	(0.222)	(0.133)	(0.200)	(0.181)	(0.242)
Competition × Soc.2		− 0.111		− 0.061		− 0.344
		(0.281)		(0.262)		(0.354)
AV (Approval Voting)	1.206***	1.441***	0.951***	1.132***	1.318***	1.342***
	(0.179)	(0.269)	(0.171)	(0.247)	(0.211)	(0.257)
Competition × AV		− 0.448		− 0.351		− 0.032
		(0.328)		(0.326)		(0.372)
AVBeforePV	− 0.103	− 0.108	− 0.143	− 0.149	− 0.328	− 0.367
	(0.160)	(0.160)	(0.210)	(0.209)	(0.264)	(0.272)
EconMajor	− 0.315*	− 0.319*	− 0.393*	− 0.392*	0.456*	0.454*
	(0.163)	(0.164)	(0.211)	(0.211)	(0.269)	(0.275)
Female	0.032	0.030	0.067	0.066	− 0.175	− 0.199
	(0.159)	(0.160)	(0.210)	(0.210)	(0.253)	(0.263)
Constant	− 1.840***	− 2.025***	− 1.649***	− 1.786***	1.212	0.595*
	(0.258)	(0.350)	(0.271)	(0.322)	(0.751)	(0.351)
Comp. + Comp. × Soc.2		0.221		0.200		0.214
		(0.251)		(0.317)		(0.327)
Comp. + Comp. × AV		− 0.116		− 0.090		0.523
		(0.237)		(0.285)		(0.407)
Observations	560	560	560	560	560	560

Standard errors in parentheses, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

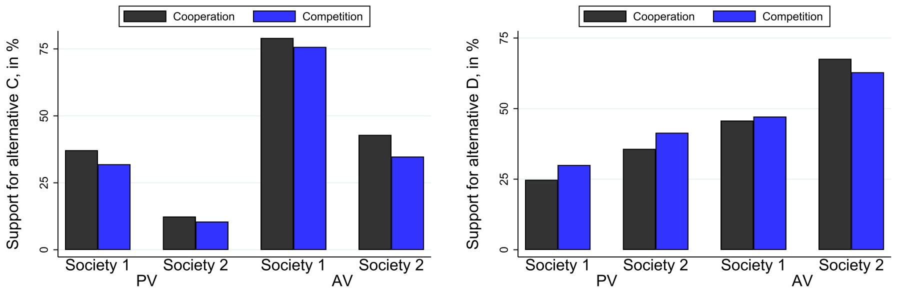

Fig. 4 Voters' support for the fair alternative C (left) and the efficient alternative D (right) aggregated across types, by treatment (cooperation vs. competition), society (Society 1 vs. Society 2), and voting methods (PV vs. AV)

to the fact that D is payoff-maximizing, and not to the fact that it is payoff-efficient for the group.

One could ask whether the shift to D occurs because it is payoff-maximizing or merely because it is better (for a specific voter type) than the egalitarian alternative C. Our data suggests that the reason is that D is payoff-maximizing. Recall that the difference between societies is that Type 1 voters are Efficiency Winners in Society 2, i.e., they are better off under the efficient outcome than in the egalitarian one. Thus, these voters could also justify supporting the efficient alternative in terms of the common good, and this would benefit them compared to the egalitarian alternative. The key difference to Type 3 voters, however, is that the efficient alternative is better for them than the egalitarian one, but it is *not* the (selfishly) payoff-maximizing one. However, in Society 2, voters of Type 1 do not vote less often for alternative C under the competitive frame, as shown by the non-significant linear combination test at the bottom of Table 3 (PV; 7.14 vs. 7.14%).

The discussion above refers to Plurality Voting. For Approval Voting, however, approving of one option does not come at the cost of having to withdraw approval from another option. As a consequence there is no threat of "wasting the vote" by approving alternatives with low winning chances. Hence, the method has been often argued to be more robust, in particular in terms of strategic behavior (Brams and Fishburn 1978, 2005; Wolitzky 2009; Alós-Ferrer and Buckenmaier 2019).

Indeed, we find no significant differences in approvals for alternative C or D for AV (linear-combination tests in Tables 3 and 4, respectively).

4 Conclusions

We show that framing an election in terms of competition instead of cooperation reduces the chances that cooperative, egalitarian alternatives are elected. The analysis of individual behavior shows that the effect mainly comes from voters whose (group-)payoff-maximizing option is also payoff-efficient, i.e., maximizes aggregate payoffs for the entire society. However, this shift does not occur for voters whose payoff-maximizing option differs from the payoff-efficient one. That is, the shift is not due to an enhanced preference towards payoff efficiency, but rather towards selfish payoff maximization, possibly related to ingroup bias. In other words, a competitive frame induces voters to shift support from egalitarian alternatives towards selfish ones, but only if they can (self-)justify this shift on the grounds that the selfish alternative benefits the common good.

Our results are particularly striking because our framing manipulation was minimal, reducing to whether voters were referred to as "cooperators" or "competitors." In actual group decisions, an "us vs. them" competitive frame might often be particularly strong, e.g., when the decision affects ideological or belief-based positions. Thus, our work suggests a detrimental psychological channel leading to less-cooperative outcomes when the social or political discussion emphasizes thinking in terms of competition among different groups.

This effect, however, is absent if the voting method is changed to Approval Voting instead of simple majority (Plurality Voting). This is in line with theoretical results showing that Approval Voting is less susceptible to strategic voting, i.e., misrepresentation of preferences, than other methods. The difference between Plurality Voting and Approval Voting is also in agreement with previous results showing that the latter is more robust than the former to other forms of framing (gains vs. losses; Alós-Ferrer et al. 2021) and psychological manipulations (time pressure; Alós-Ferrer and Garagnani 2022), and that it reduces ingroup bias (Baron et al. 2005). Our work hence contributes to the growing literature suggesting that shifting to alternative voting methods might be beneficial for society.

The experiment reported here, however, concentrated on Plurality Voting and the comparison to Approval Voting. A natural avenue for future research would be to extend the comparison to additional voting methods. AV provides voters with more possibilities to express their preferences compared to PV. The fact that PV severely constrains voters in this respect creates frequent and transparent incentives to misrepresent preferences (Balinski and Laraki 2020; Lachat and Laslier 2024). Hence, future research should consider other methods which allow voters to express their preferences in greater detail than PV.

For instance, the Borda Count method (Saari 1994, 2000) asks voters to rank all alternatives and transforms those ranks into points which determine the winner. Other relevant examples used in actual political elections around the world belong to the class of rank-order voting methods. For example, variants of Single Transferable Vote (STV) or "alternative vote" are used for political elections in Australia and Ireland (see, e.g.,Emerson 2013). Under those systems, voters provide a full or partial ranking of alternatives, and alternatives which are ranked first by the fewest voters are eliminated from all ballots before the process is iterated. Under the two-round system (TRS), used for example in the French presidential elections (Bouton and Gratton 2015), voters participate in two rounds of plurality voting, and the two candidates that receive the most votes in the first round participate in a second runoff plurality vote. It would be particularly interesting to examine the robustness of those methods to framing, compared to PV and AV. The reason is that rank-order methods as STV or TRS provide voters with more possibilities to express their preferences than PV, and hence should be less susceptible to this particular criticism. However, those methods, unlike AV, aggregate preferences and are hence manipulable in the sense of Gibbard (1973) and Satterthwaite (1975). It is hence an open question whether such methods will perform better than Plurality Voting in terms of robustness to framing.

Appendix

Appendix A Printed experimental instructions

The following (translated) instructions, including screenshots, were provided to participants as a printed handout. There were different instructions for the two treatments (cooperation vs. competition), as indicated by the alternatives in square brackets below.

General instructions for treatment cooperation and [treatment competition]

Welcome! The overall duration of this experiment is approximately one hour. If you have difficulties understanding something now or during the experiment or if you have any questions, please raise your hand and remain seated. We will come to you to answer your question. It is important that you read the instructions and all the explanations on the screen carefully before you start making decisions.

During the experiment, it is forbidden to talk to other participants in the experiment or to communicate with them in any other way. Failing to comply will lead to the exclusion from any payments.

In the following, the general course of the experiment is explained. Today's experiment consists of **three decision-making parts and a subsequent questionnaire**.

In the three decision-making parts, you can earn **Experimental Currency Units (ECU)**. How many ECU you will earn depends on your decisions and decisions made by the other experiment participants. At the end of the experiment, your earnings in ECUs will be converted to Euros. The conversion of your ECUs to Euros will be made in the following way:

$$1 \text{ ECU} = 0.20 \text{ Euros} \quad \text{or} \quad 100 \text{ ECUs} = 20 \text{ Euros}.$$

You will receive the total amount in cash at the end of the experiment **anonymously**. On the next page, you will find further information on the experiment.

[Next Page] You have been allocated to a group of six people **(cooperators) [(competitors)]** that have to jointly decide how to allocate the available resources among the **cooperators [competitors]** of the group. The decision will be made by voting. Therefore, voting decisions will determine how the available resources are shared.

General procedure:

In each of the three parts you are going to take part in several elections. You are going to decide with five other voters about the outcome of the election. The voting method differs in each decision-making part and will be explained to you in detail on-screen. Each time, there will be 4 alternatives to choose from: A, B, C, and D.

Voting decision:

Your task is to choose between the alternatives in each round according to this election's method. Please notice that you have to make a decision and are not allowed to abstain. Thus, you have to fill a valid ballot in each round.

Payoffs:

At the end of the experiment, **one out of all the rounds will be chosen randomly, and this voting result will be implemented. Thus, your payment will be determined by the winning alternative in the chosen round. It does not matter if you have voted for the winning alternative or not.**

Layout on screen:

On the screenshot below [Figs. 5 or 6, respectively], you can see how a typical decision-making screen looks like (depending on the voting method, the screen may differ). The numbers on the screenshot are only an example to illustrate some particular elements. The exact numbers on the screen during the experiment will differ from the numbers

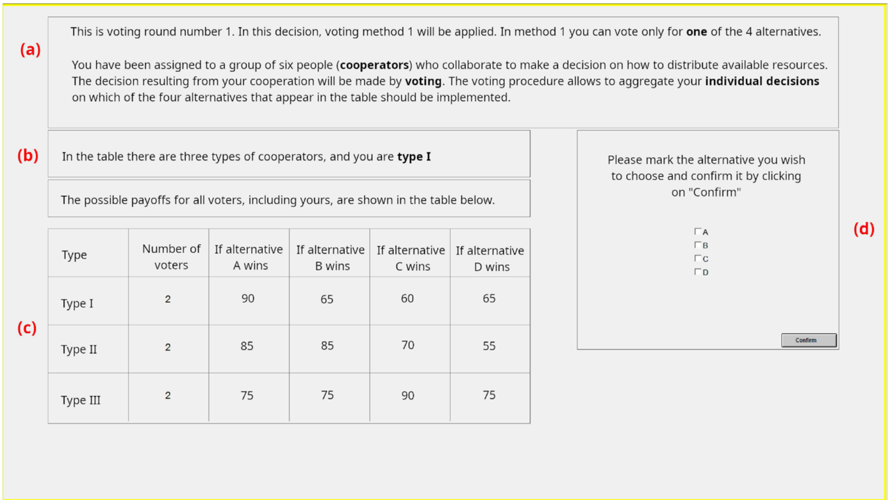

Fig. 5 Sample screenshot used in the instructions for the cooperation frame, translated from the original Spanish version

in the example below. However, the information for the experiment will be displayed as in the example.

• In box "a," on the upper edge of the screen, you see information about the current round. In addition, you are informed about which part of the experiment you are in, and the rules of the voting method that apply to the current round are explained to you again.
• In box "b" you are informed about your type for the current round.
• Table "c" displays the details of the payoffs for each type in the current round. In this example your potential payoffs are the ones of type I.
• In box "d" you can see that the ballot you have to use contains all the alternatives. Depending on the voting method, the ballot can vary a bit. Please fill in the ballot according to the voting method used in the current round. To confirm your decision click on "confirm."

How to read your payoff profile:
In this example you would receive the following payment in ECUs:
If alternative A wins, you earn 90 ECUs.
If alternative B wins, you earn 65 ECUs.
If alternative C wins, you earn 60 ECUs.
If alternative D wins, you earn 65 ECUs.

If, for instance, alternative C wins the election, you will earn 60 ECUs. Your payment does not depend on whether you have voted for C or not. Only the winning alternative matters for your payment in ECUs. Please keep in mind that the possible payoffs in this example will differ from those in the experiment.

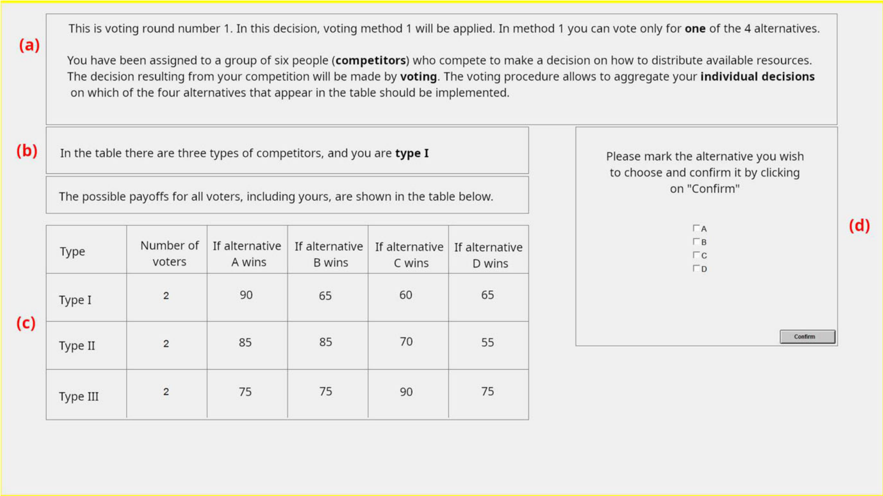

Fig. 6 Sample screenshot used in the instructions for the competition frame, translated from the original Spanish version

How to read the payoff profile of all six voters:
In Table c, the payment profiles of all the six voters are displayed. This includes your payoff profile as well. The first column of the table ("type") tells you the type of the voters, and the potential payoffs for every type are specified in the corresponding row. The second column ("number of voters") tells you how many voters of every type there are. In this example, you are of type I. Therefore, your potential payoffs are displayed in the first row. In addition, there are other 2 voters whose payoffs are displayed in the second row and 2 voters whose payoffs are displayed in the third row.

In this example, the first row of the table tells you that the 2 voters of type I would get 90 ECUs if alternative A wins the election, 65 ECUs if B wins, 60 ECUs if C wins, and 65 ECUs in case alternative D wins the election. The second row of the table tells you that the 2 voters of type II would get 85 ECUs if alternative A wins the election, 85 ECUs if B wins, 70 ECUs if C wins, and 55 ECUs in case alternative D wins the election. The third and last row tells you that the 2 voters of type III would get 75 ECUs if alternative A wins the election, 75 ECUs if B wins, 90 ECUs if C wins, and 75 ECUs in case alternative D wins the election.

As you can see, there are 6 voters in total. The table displays the possible payoffs of all the voters: **Your own possible payoffs, as well as the payoffs of the other 5 voters** who have to decide jointly with you. Please keep in mind that the payoffs in the experiment will differ from the ones in this example.

Control questions:

Please answer the following comprehension questions. If you have any questions, please raise your hand and remain seated. We will come to you to answer your question.

QUESTION 1: The payment in ECUs I am going to receive in every voting round depends on: (Please circle the correct response)

a) On which alternative wins the election.
b) On the alternative I voted for.

QUESTION 2: The total payoff I receive for my decisions is computed: (Please circle the correct response)
a) By collecting the payoffs of every decision.
b) At the end of the experiment, the round that will be implemented is randomly determined. I will receive my payoffs according to the result of this round.

QUESTION 3: I know the possible payoffs of all the other voters. True or false?
a) True b) False

QUESTION 4: Consider the possible payoffs in the screenshot displayed in the example on page *[page]*. How many voters have the same possible payoffs as you? (apart from yourself)
a) Two b) One

QUESTION 5: Consider again the possible payoffs in the screenshot displayed in the example on page *[page]*. If these are the payoffs of all the voters, and you are of type II, how many ECUs would you get if alternative C wins the election?
a) 60 b) 70 c) 90

Appendix B On-screen presentation

We introduced each voting method in a single short screen before the start of the elections. Depending on the (randomized) order, subjects were presented with PV first and AV later or the other way around. The methods were labeled neutrally (voting method 1 or 2), depending on the order in which participants saw them.

For PV, the on-screen text was as follows (translated from the original Spanish version).

In this part you will conduct 6 rounds of voting. In these 6 rounds, the first [second] voting method will be implemented.
In the first [second] voting method you can vote **only for one of the 4 alternatives**. *With this method, the alternative receiving more votes wins the election in this round. In case of a tie, the computer randomly decides.*

For AV, the on-screen text was as follows(translated from the original Spanish version).

In this part you will conduct 6 voting rounds, the second [first] voting method will be implemented.
In the second [first] voting method you can vote for **several alternatives at the same time**, *but not more than once for each alternative. That is, you can vote for as many alternatives as you wish. Each alternative that you voted for obtains one complete vote. With this method, the alternative receiving more votes wins the election in this round. In case of a tie, the computer randomly decides.*

Regarding the voting screens, Figs. 5 and 6 above were used in the voting screen for the PV method. For the AV method, the voting screen was very similar. See Fig. 7

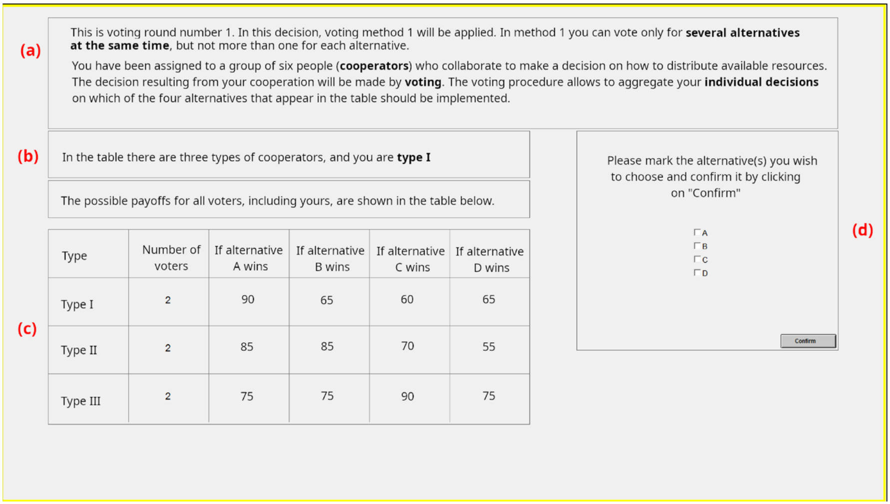

Fig. 7 Sample screenshot used in the instructions for the cooperation frame and AV, translated from the original Spanish version

for the cooperative frame, which is the equivalent of Fig. 5 for AV instead of PV. In particular, Boxes (b) and (c) of the screen were identical, while boxes (a) and (d) were slightly modified to accommodate the AV method. The only change in box (a) was that the third sentence, i.e., "In method 1 you can vote only for **one** of the 4 alternatives" was replaced by " In voting method 1 you can vote for **several alternatives at the same time**, but not more than once for each alternative." The ballot was box (d). The only change here was that the word "alternative" was replaced by "alternative(s)"

Appendix C Individual voting behavior

See Table 5.

Table 5 Proportion of votes or approvals for each alternative by voting method, treatment, Society, and voter type

Voting method	Treatment	Society	Voter TYPe	Vote A	Vote B	Vote C	Vote D
PV	Coop	Soc 1	1	0.56	0.03	0.36	0.06
			2	0.01	0.54	0.41	0.03
			3	0.00	0.00	0.34	0.66
		Soc 2	1	0.76	0.01	0.07	0.16
			2	0.00	0.64	0.19	0.17
			3	0.13	0.01	0.11	0.74
	Comp	Soc 1	1	0.54	0.00	0.40	0.06
			2	0.01	0.56	0.34	0.09
			3	0.01	0.01	0.21	0.76
		Soc 2	1	0.69	0.00	0.07	0.24
			2	0.00	0.63	0.19	0.19
			3	0.13	0.00	0.06	0.81
AV	Coop	Soc 1	1	0.87	0.09	0.79	0.21
			2	0.06	0.86	0.79	0.30
			3	0.21	0.13	0.80	0.86
		Soc 2	1	0.81	0.06	0.37	0.70
			2	0.09	0.84	0.63	0.36
			3	0.59	0.06	0.29	0.97
	Comp	Soc 1	1	0.91	0.09	0.76	0.21
			2	0.09	0.93	0.79	0.26
			3	0.19	0.06	0.73	0.94
		Soc 2	1	0.96	0.04	0.21	0.59
			2	0.06	0.90	0.61	0.34
			3	0.57	0.07	0.21	0.96

Proportion of approvals do not need to add up to one since voters can approve of several alternatives

Acknowledgements We gratefully acknowledge financial support from German Research Foundation under Project Al-1169/2 (C.A.-F.), and the Spanish Ministerio de Ciencia e Innovación (PID2022-136977NB-I00), Generalitat Valenciana (CIAICO/2023/102), and Universitat Jaume I (B2020-16) (J.G.-S.).

Data availability Data and codes for this article are publicly available at https://osf.io/y593x/

Declarations

Conflict of interest The authors have no conflict of interest.

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