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Abstract

When voters have different information quality, voting rules with richer ballot spaces can help voters better aggregate information by endogenously allocating more decision power to better-informed members. Using laboratory experiments, we compare two polar examples of voting rules in terms of ballot richness: majority voting (MV) and continuous voting (CV). Our results show that CV outperforms MV on average, although the difference is smaller than predicted, and that CV has more support than MV in treatments where it is expected to perform better. We also find that voters with intermediate information overestimate the importance of their votes under CV.

Keywords: voting, information aggregation, experiment, majority, continuous voting

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1 Introduction

Voting is a widespread practice across our society: citizens vote to elect their representatives, shareholders to decide on managerial proposals, or countries to determine the international organizations' resolutions. In many of these institutions, voters are bound to either cast their vote to fully support one of the available options or abstain entirely. The dichotomous nature of the vote constrains the comprehensive expression of voter preferences and knowledge, leading to associated welfare costs. In the context of preference aggregation, it can lead to the so-called tyranny of the majority (i.e., a majority of voters impose a choice they care little about on a minority who cares intensely), while in the realm of information transmission, it results in information loss, and hence suboptimal decisions.

These issues have prompted the exploration of innovative voting systems designed to expand the range of choices available on the ballot. These include methods such as approval voting (Brams and Fishburn, 1978), storable votes (Casella, 2005), qualitative voting (Hortala-Vallve, 2012), and quadratic voting (Lalley and Weyl, 2018), among others. This literature has established that, in theory, broadening the options within the ballot space can effectively address certain inefficiencies associated with dichotomous voting.[1]

In this paper, we empirically examine the impact of ballot richness on collective decision-making, with a particular focus on information aggregation. In this context, traditional rules utilizing dichotomous votes, such as majority rule systems, exhibit two primary limitations: (i) they assign equal weight to all participating members, regardless of the quality of their information and (ii) entirely disregard the information of those who abstain.[2] On the opposite end of the spectrum in terms of ballot richness, is the system we call continuous voting (CV hereafter), where voters have the flexibility to endogenously allocate weights to their votes. Under such a mechanism, voters can adjust the weight they assign to their votes based on the quality of their information, placing more weight on better information. In equilibrium, voters have incentives to select optimal weights that implement efficient decisions for any given information structure.[3,4] The question is whether the desirable properties of this additional flexibility might be overturned by the additional complexity of the rule and the

[1]This body of literature has primarily focused on preference aggregation. Exceptions can be found in Ahn and Oliveros (2016) and Bouton et al. (2017).

[2]Abstention can arise in equilibrium as shown in Feddersen and Pesendorfer (1996). Such behaviour has been observed in the laboratory (see, e.g., Battaglini et al. (2010) and Herrera et al. (2019a)).

[3]Nitzan and Paroush (1982) characterizes the optimal weights that voters should assign to their votes in order to fully aggregate information. Chakraborty and Ghosh (2003) and Bouton et al. (2024) show that such weights emerge in equilibrium when subjects can endogenously decide.

[4]Núñez and Laslier (2014) show that allocating a discrete amount of votes does not change the equilibrium outcomes in the case of private values. This implies that allowing voters to endogenously choose the weights assigned to their votes might lead to a Pareto improvement.

coordination issues due to the great multiplicity of efficient equilibria.

We present the findings of a laboratory experiment in which groups decide with CV or with simple majority. First, we assess whether, as predicted by the theoretical model, CV yields superior welfare compared to majority rule. Second, we examine the voting behaviour under CV. A distinctive theoretical feature of this voting method lies in its robustness to variations in the number of voters, the introduction of new participant types, or changes in information technology. We designed experimental treatments to test for this robustness in the data. Third, we explore the impact of communication on behaviour and welfare. According to theoretical predictions, communication can mitigate welfare differences between systems. To test this prediction, we have treatments where subjects can communicate before voting. Finally, we investigate participants' preferences over these voting methods. In the absence of communication, they should prefer CV, and should be indifferent when communication is allowed.

Our key findings are as follows. First, in the absence of communication, CV leads to higher welfare than simple majority although the difference is not always significant and the magnitude of the difference is smaller than predicted. When communication is introduced, we do not observe significant differences in outcomes between the two voting rules. Second, under CV, subjects frequently use *partial abstention*–assigning higher weights to their vote when they possess better information. As predicted by the theory, voting behaviour is quite similar across treatments varying the number of voters, the introduction of new participant types, and changes in information technology. A notable deviation from our predictions is that participants with intermediate information assign disproportionately high weights compared to the most informed subjects. Third, in treatments without communication, subjects generally favor CV, with the extent of the support correlating with the difference in payoffs between the two mechanisms experienced in prior parts of the experiment. When communication is introduced, the preference overwhelmingly shifts toward simple majority.

Our paper contributes to the literature on information aggregation in binary elections.[5] Our main contribution with respect to this literature is to allow for divisible votes. By extending the ballot richness, we allow for the mechanism to fully aggregate information, even in small electorates. Within this broader literature, our study is particularly related to research on strategic abstention. A well-established finding in this area is that less informed voters abstain from voting in equilibrium (Feddersen and Pesendorfer, 1996; McMurray, 2013; Herrera et al., 2019b). Such behaviour has also been observed in the experimental

[5]See, e.g., Austen-Smith and Banks (1996); Feddersen and Pesendorfer (1997, 1998); Myerson (1998); Bhattacharya (2013); Bouton et al. (2018); Barelli et al. (2019). Various predictions of these theories have been tested using laboratory experiments (see, for example, Ladha et al. (1996); Guarnaschelli et al. (2000); Bhattacharya et al. (2014); Bouton et al. (2017)).

data (Battaglini et al., 2010; Morton and Tyran, 2011; Mengel and Rivas, 2017; Herrera et al., 2019a). Our experiment shows that when voters have access to a richer ballot space, full abstention declines significantly. Instead, voters express their views while making use of partial abstention, allowing them to assign greater voting power to better-informed participants without completely silencing the less informed ones.[6]

Our experiment also contributes to the growing literature on how groups select electoral rules to make decisions. Engelmann and Grüner (2017) examine the choice of voting thresholds for adopting reforms at the interim stage, where individual preferences are already realized. Their findings highlight that preferences are shaped by both self-interest and efficiency concerns.[7] Weber (2020) and Hoffmann and Renes (2022) analyse rule selection at both the ex-ante and interim stages, documenting significant divergences in preferences between these stages. Our study complements this literature in two ways. First, we focus on information aggregation in a common-value setting, where individual interests and efficiency objectives are aligned. This eliminates the tension between self-interest and group welfare, which in turn reduces the potential divergence in rule preferences across the ex-ante and interim stages. Second, we investigate individual preferences for voting mechanisms with differing levels of ballot richness, providing new insights into the implications of expanding voters' decision-making flexibility.

2 Theory

The primary goal of our theoretical analysis is to characterize the equilibria under Continuous Voting and compare their properties to those under Majority Voting. We adapt the framework from our companion paper Bouton et al. (2024) to reflect the experimental constraints, such as finite and symmetric signals. Proofs can be found in Appendix A.

2.1 Setup

A finite number of $n > 2$ voters must decide between two alternatives, A or B. Voters have common values and have uncertainty about which is the superior alternative. In particular, there are two possible states of the world, denoted by $\omega \in \{\alpha, \beta\}$. We denote the probability

[6] Campbell et al. (2022) analyse an alternative mechanism where voters can delegate their votes to others, thereby concentrating voting power with those who possess greater expertise. However, this comes at the cost of the delegating voters forfeiting their ability to convey their own information. In contrast, the mechanism we propose allows voters to empower experts while still retaining the ability to express their own information.

[7] Engelmann et al. (2023) extend this analysis by investigating rule choices made under the veil of ignorance, where individual preferences are not yet known. See also Blais et al. (2015) and Bol et al. (2023) for related findings.

of state α by $\Pr(\alpha)$. Voters' preferences are such that

$$u(A|\alpha) = u(B|\beta) = 1 \tag{1}$$
$$u(B|\alpha) = u(A|\beta) = 0$$

where $u(x|\omega)$ denotes the utility if alternative x is chosen in state ω.

Information Structure. The state of the world cannot be observed directly, but each voter i receives an informative signal s_i. These signals are of heterogeneous quality, reflecting the fact that citizens differ in their expertise on the issue at hand. Specifically, each citizen is endowed with information quality $p_i \in P$, where P is a non-singleton finite set in $(\frac{1}{2}, 1)$. Precisions are drawn independently across players according to a common probability distribution F. We denote the set of signals by $S = \{s^p_\omega \mid \omega \in \{\alpha, \beta\}, p \in P\}$. Conditional on the draw of p_i, the citizen draws her signal, either $s^{p_i}_\alpha$ or $s^{p_i}_\beta$, according to the following:

$$Pr(s_i = s^{p_i}_\omega \mid p_i, \omega) = p_i, \qquad Pr(s_i = s^{p_i}_{-\omega} \mid p_i, \omega) = 1 - p_i.$$

That is, each citizen knows her signal precision p_i, and receives a correct signal on the state with probability p_i. We denote by $t^p_\omega = \frac{\Pr(s^p_\omega|\alpha)}{\Pr(s^p_\omega|\beta)} = (\frac{p}{1-p})^{(\mathbb{1}(\omega=\alpha)-\mathbb{1}(\omega=\beta))}$ the type associated with signal s^p_ω. The type space is $T = \{\frac{p}{1-p} \mid p \in P\} \cup \{\frac{1-p}{p} \mid p \in P\}$ and we denote by t_i the type of voter i.

In order to make the problem interesting, we assume that the information structure is such that it is not always optimal to follow the prior. In other words, we assume that the maximum precision is high enough that there are realizations for which it is optimal for the group to go against the prior.[8]

The voting rules. We consider two voting rules. Under *Majority Voting* (MV, hereafter), agents must choose a vote $v_i \in V^{MV} = \{-1, 0, 1\}$, where $v_i = 1$ indicates a vote for A, $v_i = -1$ a vote for B, and $v_i = 0$ indicates abstention. Under *Continuous Voting* (CV, hereafter), each voter must choose a number $v_i \in V^{CV} = [-1, 1]$. Under both rules, A (B) is implemented if $\sum_i v_i > 0$ (< 0), with ties broken randomly.

Profiles and equilibrium. A (symmetric) strategy profile is characterized by a mapping $\sigma : T \to \Delta(V)$, associating a (possibly random) vote from the ballot space V to each possible

[8]Formally, we assume that $\left(\frac{1-\max P}{\max P}\right)^n \leq \frac{Pr(\alpha)}{1-Pr(\alpha)} \leq \left(\frac{\max P}{1-\max P}\right)^n$.

type. Slightly abusing terminology, we say that a profile σ is *efficient* if

$$Pr(\alpha \mid t_1, \ldots, t_n) > \tfrac{1}{2} \quad \Rightarrow \quad \sum_{i=1}^{n} \sigma(t_i) > 0$$
$$Pr(\alpha \mid t_1, \ldots, t_n) < \tfrac{1}{2} \quad \Rightarrow \quad \sum_{i=1}^{n} \sigma(t_i) < 0.$$

When the prior is even, it is often relevant to focus on *double-symmetric* profiles, i.e. such that $\sigma(t) = -\sigma(1/t)$ for all t. Throughout, we focus on the notion of Bayes-Nash equilibrium (henceforth equilibrium). We say that an equilibrium σ is *non-trivial* if $\Pr_\sigma(A) \in (0, 1)$.

2.2 Equilibrium Analysis and Welfare

We start by a result underlining the efficiency of CV.

Proposition 1. *Under CV, when the prior is even, there are double-symmetric, efficient equilibria σ, such that:*

$$\sigma(t) = \kappa \log(t) \quad \textit{with} \quad \kappa \in \left(0, \left(\log\left(\tfrac{max\ P}{1-max\ P}\right)\right)^{-1}\right]$$

Under the equilibrium described in Proposition 1, voters pick optimal weights for information aggregation given their signal precisions, as described in the seminal result of Nitzan and Paroush (1982). As this strategy profile is efficient in a common value game, it is an equilibrium by the standard argument of McLennan (1998).[9]

Unlike typical findings in the literature on strategic participation, the equilibria described in Proposition 1 do not feature full abstention. All voters partially abstain unless they have maximum precision, and weights increase with signal precision. Notably, this equilibrium is robust to changes in the information structure: equilibrium strategies are independent of the precision distribution, the number of voters and the addition of new precisions to the initial set P.[10]

Proposition 1 highlights that there is a great multiplicity of efficient equilibria under CV. There is actually a continuum of such equilibria, for all the different values of κ. The efficiency of CV thus relies on the ability of voters to coordinate on the same efficient equilibrium strategy. As discussed in the Introduction, there is evidence that such coordination often proves quite challenging in practice.

[9]The proof of Proposition 1 is analogous to Proposition 2 in Bouton et al. (2024), and is therefore omitted.

[10]Provided that $\max P$ does not change.

There might also exist other efficient equilibria beyond those outlined in Proposition 1. For a small electorate, minor deviations from the described strategies can still constitute an equilibrium (for a fixed perturbation size ε, this happens if for any set of signal realizations, the posterior is sufficiently far from 1/2). Yet, there are at least two cases in which every efficient equilibria must belong to the set characterised in Proposition 1: when the electoral size n becomes large or when (in an extended model) F has full support on $(\frac{1}{2}, \max P]$.

Finally, note that Proposition 1 only deals with the case of an even prior. Yet, the result extends to the case of an uneven prior: CV remains efficient, and the following symmetric strategy profiles constitute efficient equilibria: $\sigma(t) = \kappa\left(c + \log(t)\right)$, where $c = \frac{1}{n}\log\left(\frac{\Pr(\alpha)}{1-\Pr(\alpha)}\right)$ and $\kappa \in \left(0, \left(\log\left(\frac{max\ P}{1-max\ P}\right) + |c|\right)^{-1}\right]$.

We now turn our attention to equilibria under MV. We say that a strategy $\sigma_i : T \to \Delta(\{-1, 0, 1\})$ is a *monotone cutoff strategy* if the support of $\sigma_i(t_i)$ is a (weakly) increasing correspondence of t_i and if $\sigma_i(t_i)$ is a pure action in $\{-1, 0, 1\}$ for all but at most two types (i.e. the cutoffs).

Proposition 2. *Under MV, a non-trivial equilibrium always exists. In any such equilibrium, each player employs a monotone cutoff strategy.*

Proposition 2 indicates that (non-trivial) equilibrium strategies under MV can be described by two cutoffs. Each voter votes for B (i.e. -1) when her type falls below the lowest cutoff, and for A (i.e. 1) if it falls above the highest cutoff, while she abstains if it falls in between the two cutoffs. Mixing is possible if a voter's type coincides with one of the two cutoffs.

We now focus on the comparisons of CV and MV under their best equilibria. We say that a strategy profile σ (strictly) dominates another one τ if the ex-ante probability of implementing the correct outcome (A in α and B in β) is (strictly) higher in σ than in τ.[11]

Proposition 3. *The best equilibrium under CV dominates the one under MV. When the prior is even, for any non-singleton finite set of signal precisions $P \subset (1/2, 1)$, there exists $n(P)$ such that if n is even or if $n \geq n(P)$, then the dominance is strict.*

The intuition for Proposition 3 is that extending the strategy space of players in a common value game can only allow voters to reach a better equilibrium.[12] More precisely, we know that (i) there are efficient equilibria under CV that are not feasible under MV since they involve partial abstention, and that (ii) these efficient equilibria dominate any feasible

[11]Note that this dominance relation is consistent with our efficiency notion since any efficient profile dominates any non-efficient one.

[12]This result is reminiscent of the finding of Ahn and Oliveros (2016) that Approval Voting dominates other voting rules in multi-candidate elections because of its richer ballot space.

strategy profile under MV, i.e., any profile for which each voter either votes "fully" in favor of one alternative, or abstains. The precise condition for (ii) to hold strictly is that the number of voters n is even, or higher than a constant $n(P)$, which is typically quite low. For instance, the condition always holds strictly in committees of at least 5 voters if the highest and lowest precisions differ by at least 0.1. The dominance of CV over MV is thus strict for all our experimental parameters, as described in Section 3 below.[13]

There are three caveats to this result. First, by expanding the strategy space (going from MV to CV), it could be that CV also produces worse equilibria than MV. However, in Bouton et al. (2024) we show that the worst equilibrium under CV is no worse than under MV. Second, the result remains silent on the relative complexity of reaching the most efficient equilibrium under any of the two rules. On the one hand, the efficient equilibrium of CV requires (at least approximately) fine-tuning one's weight as a function on the signal precision, while the most efficient equilibrium under MV simply consists of abstaining below a certain level of precision . On the other hand, when the environment (parameters of the game) varies, equilibrium strategies remain the same under CV, while the abstention cutoffs may be complex to determine under MV. Finally, there is a great multiplicity of efficient equilibria under CV, and voters need to coordinate on one of them in order for CV to feature its desirable properties. By contrast, coordination issues seem less prevalent under MV. For example, for the experimental parameters, there is a unique pure-strategy double-symmetric payoff dominant equilibrium under MV. Testing the two rules in the lab allows us to study how players address these challenges.

Finally, we consider an extended game where the voting stage is preceded by a communication stage. This communication stage is assumed to be a simultaneous, cheap talk game. For simplicity, we assume that the set of messages that each player can send coincides with the set of signals.

Proposition 4. *Under communication, there are efficient equilibria under both voting rules.*

The intuition for Proposition 4 stems from the simple logic described in Gerardi and Yariv (2007): under common values, there is an equilibrium of the communication game where all voters truthfully report their signal and then they all vote for the alternative most likely to be correct given the set of signal realizations. Note that there exists a multiplicity of efficient equilibria and that individual votes are not pinned down by the requirement to play an efficient equilibrium.

[13] The strict dominance result in Proposition 3 is stated for an even prior. Yet, as we show in Appendix A, CV also strictly dominates MV for our Asymmetric Prior treatment.

3 The Experiment

3.1 Experimental Design

We designed various treatments to test the theoretical predictions from Section 2. In the beginning of the experiment, subjects were randomly divided into groups of 5 or 9, and these groups were fixed for the rest of the experiment. Except for the voting rule, the set of parameters was fixed throughout the session. The experiment consisted of *three parts*. In the first two parts, groups had to vote for 20 rounds using either MV or CV, with different rules in the two parts.[14] At the beginning of part three, each group had to decide which rule to use. Each subject chose one of the rules, and one of the decisions was randomly picked and implemented (i.e. we implemented random dictatorship) for 10 additional periods (with the same parameters as in parts 1 and 2).

At the beginning of each round, the color of a triangle was chosen randomly to be either blue or red with probabilities $\Pr(\alpha)$ and $1-\Pr(\alpha)$ respectively. Subjects were not told the color of the triangle, but were told that their goal would be to work together as a group to guess the color of the triangle. Independently, each subject would observe one ball (a *signal*) drawn randomly from an urn with 100 blue and red balls. The exact composition would depend on their *precision*. The precision of each voter was private information and randomly drawn in each round from a commonly known distribution. After observing their signals, each subject had to vote. The group decision was the color that received more votes, with ties broken randomly. Subjects' payoffs was 100 points if the color chosen by the group was the same as the color of the triangle and 0 points otherwise.

We had different configurations of parameters, i.e., *environments*, summarized in table 1. In the environment called *Baseline* (B), $n = 5$, $\Pr(\alpha) = 0.5$, the set of different precisions was $\{55\%, 60\%, 95\%\}$, and the likelihood of each precision was 0.15, 0.7 and 0.15 respectively. All other environments are variations of this one. Under *Distribution* (D), we change the likelihood of the precisions to 0.25, 0.5 and 0.25 respectively. Under *Size* (S), we change $n = 9$. Under More Types (MT), we increase the set of different precisions to $\{55\%, 60\%, 75\%, 95\%\}$, and the likelihood of each precision was 0.15, 0.5, 0,2 and 0.15 respectively. Under *Asymmetric Priors* (A), we change the prior to $\Pr(\alpha) = 0.3$. Under *Communication* (C), we allow subjects to freely communicate before they vote. Table 1 also includes the strategy in the payoff dominant equilibrium under simple majority.[15]

[14] We balanced the two sequences: half of the groups use MV in part 1 and CV in part 2, while the remaining half followed the opposite order.

[15] There is multiplicity of equilibria under majority. Table D1 in the appendix summarizes all the equilibria under majority in symmetric treatments.

Parameters	n	Prior	Prob. of each Precision 55%	60%	75%	95%	Chat	$E\pi^{MV}$	$E\pi^{CV}$	Eq MV vote
Baseline	5	0.5	0.15	0.7	-	0.15	-	76	83	All
Distrib (D)	5	0.5	0.25	0.5	-	0.25	-	85	89	iff $p_i \geq 95$
Size (S)	9	0.5	0.15	0.7	-	0.15	-	85	91	iff $p_i \geq 95$
More Types (MT)	5	0.5	0.15	0.5	0.2	0.15	-	82	87	iff $p_i \geq 75$
Asym Prior (A)	5	0.3	0.15	0.7	-	0.15	-	79	86	A iff $p_i \geq 95$ B iff $p_i \geq 60$
Comm. (C)	5	0.5	0.15	0.7	-	0.15	Yes	83	83	

Table 1: Summary of all the parameter constellations and equilibrium predictions for Majority Rule. Underlined parameters indicate differences with the basline set of parameters.

3.2 Experimental Procedures

Experiments were conducted at the Experimental Economics Laboratory at the University of Valencia (LINEEX) between December 2017 and February 2018. We had 12 independent groups for each treatment, making a total of 408 participants. Students interacted through computer terminals, and the experiment was programmed and conducted with the software z-Tree (Fischbacher (2007)). All experimental sessions were organized along the same procedure: subjects received detailed written instructions (see Appendix F), which an instructor read aloud. Before starting the experiment, students were asked to answer a questionnaire to check their full understanding of the experimental design. At the end of the experiment, the computer randomly selected 2 rounds from part 1, two from part two and one form part 3, and participants earned the total of the amount earned in these rounds. Points were converted to euros at the rate of 0.025€per point. In total, subjects earned an average of 14.54€, including a show-up fee of 5€. Each experimental session lasted approximately an hour.

3.3 Hypotheses

We draw a number of theoretical hypotheses from the equilibrium analysis in section 2 that we outline below. The first two hypotheses focus on voter behavior in symmetric treatments without communication. They are direct corollaries of Proposition 1 and Table 1. The third hypothesis focuses on the Asymmetric treatment. It follows from an extension of Proposition 1 to asymmetric priors and from Table 1. Finally, the last hypothesis focuses on welfare comparison across systems, which follow from Proposition 3 and Proposition 4.

Hypothesis 1. *Welfare is strictly higher under CV than MV without communication, but no welfare differences exist under communication.*

Hypothesis 2. *In symmetric treatments without communication, weights increase with signal precision (strictly under CV).*

Hypothesis 3. *In symmetric treatments without communication, behaviour under CV is independent of the environment.*

Hypothesis 4. *In the Asymmetric Prior environment, voters using CV assign higher weights to the outcome that is more likely based on the prior.*

4 Experimental Results

Our analysis focuses on data from the first two parts of the experiment to avoid selection issues. In regression analyses, we account for correlation within matching groups. Welfare regressions use the group as the unit of observation, while analyses of behaviour and mechanism choice are conducted at the individual level. Unless stated otherwise, statistical significance is assessed at the 10% level.

4.1 Welfare

We examine the welfare properties of CV and MV by analysing two metrics: the percentage of optimal decisions and the average payoffs, summarized in Table 2.

Theoretically, CV should fully aggregate information, allowing voters to replicate the decisions of a benevolent dictator with access to all the signals. In contrast, MV is only optimal when communication is allowed. The upper part of Table 2 presents the frequency of reaching the optimal decision under each mechanism and environment. The table shows three clear patterns. First, the frequency of adopting the optimal decision is consistently lower than the theoretical predictions. The deviation is substantial: under CV, the difference from the theoretical prediction is 17.67%, while for majority, it is 9.93%. Second, consistent with theoretical predictions, CV yields a higher frequency of optimal decisions than MV in all treatments without communication, except for the *Prior* environment.[16] When pooling all treatments without communication, this difference is statistically significant ($p < 0.10$), providing support for Hypothesis 1. However, when analysing treatments independently, the difference is statistically significant only in the *More* environment. No significant differences between mechanisms are observed in the presence of communication. Third, communication

[16]The probability of making the right choice aggregates mistakes of very different natures. Appendix E disaggregates optimal decisions by group posterior and demonstrates that this pattern holds consistently across different group posterior beliefs.

		CV		MV			
		Data	Eq.	Data	Eq.	Diff.	p-value
Percentage	Base	80.42	100.00	77.08	91.25	3.33	0.278
Optimal	Dist	82.92	100.00	77.92	85.21	5.00	0.292
Decisions	Size	80.00	100.00	75.00	87.29	5.00	0.251
	More	84.17	100.00	77.92	87.71	6.25	0.097
	Prio	75.42	100.00	76.25	90.83	-0.83	0.883
	Comm	92.92	100.00	92.92	92.50	0.00	1.000
Payoffs	Base	76.25	83.33	72.92	76.25	3.33	0.444
	Dist	75.42	88.33	73.33	83.13	2.08	0.705
	Size	78.75	87.08	72.92	85.63	5.83	0.091
	More	77.50	88.33	72.08	79.38	5.42	0.224
	Prio	76.25	80.83	72.92	77.50	3.33	0.476
	Comm	80.42	100.00	81.67	100.00	-1.25	0.669

Table 2: Welfare measures under both mechanisms for each environment. *Eq* displays the equilibrium prediction for the realised values, *Diff* displays the difference between CV and MV and *p-value* displays the statistical significance of the difference based on linear regressions.

significantly increases the probability of making the right choice under *both* voting mechanisms ($p < 0.01$). While this is line with the prediction under MV, it is not with CV. The magnitude of the effect of communication is also economically meaningful: it increases the probability of making the right choice by more than 10%.

We reach similar conclusions when we use the complementary measure of welfare of voters' average payoffs, summarised in the lower part of Table 2. This measure aggregates mistakes weighted by their cost. Consistently with our previous findings, average payoffs are strictly higher under CV than majority in all treatments without communication. When pooling all treatments without communication, this difference is statistically significant ($p < 0.05$). However, when examining individual treatments, the difference is statistically different than zero only in the *Size* environment. The magnitude of the difference is close to the predicted one: on average, the predicted difference in payoffs across mechanisms in environments without communication is 5.21, while in the data this difference is 4.00.[17]

In order to investigate further the differences in payoffs across mechanisms and to overcome the problem of having few observations and low statistical power, we simulated 1000 experimental sessions for each independent group based on observed behaviour for each group.[18] Figure 1 displays the cumulative distribution function of the average payoffs in

[17]Both welfare measures show an increasing trend over the periods played in the first two parts of the experiment. Our results remain robust when controlling for a common linear time trend across periods.

[18]In total, we conducted 12,000 simulated sessions for each environment-mechanism combination. Each session comprised 20 independent simulations to reflect the structure of an actual experimental session. For each simulation, a state was randomly selected, signals were randomly assigned to participants, and voting followed the distribution of votes observed in the corresponding group.

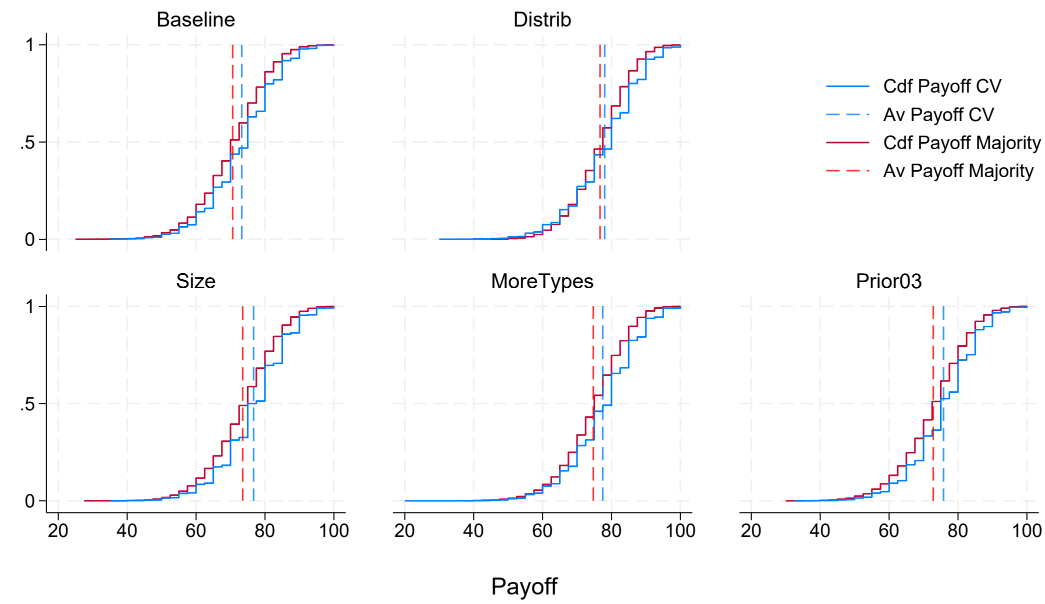

Figure 1: Cumulative distributions of (average) payoffs from 1,000 simulated experimental sessions, each consisting of 20 independent simulations based on observed behaviour (see details in footnote 18). Vertical dashed lines indicate the average payoffs for each environment and mechanism.

these sessions as well as the average payoff in these simulations. Except for the *Distrib* environment, the distribution of payoffs under CV first-order stochastically dominates the one for MV (or is very close to it).[19] As a result, the average payoffs under CV are strictly higher than average payoffs under MV. However, the magnitude of the difference is not large. Finally, in line with the theoretical predictions, we find no significant payoff differences across mechanisms in the presence of communication.

Two main factors explain the relatively small payoff differences across mechanisms whenever there is no communication. First, deviations from theoretical predictions in terms of voting behaviour (see next Section) reduce the expected payoff difference. While in the simulations the theoretically predicted difference in payoffs is 5.45, the observed difference is only 2.57—a 52.80% reduction. Second, the study focuses on symmetric signal distributions, where MV performs relatively well. Allowing for highly skewed signal distributions could significantly widen the payoff gap between the mechanisms. For example, using the parameters from Bouton et al. (2017) would yield a predicted payoff difference of 17.9 (treatments V2 and M2), nearly three times greater than the maximum payoff difference in this experiment.

[19] The distribution of payoffs under CV first-order stochastically strictly dominates the one under majority for environments *Baseline*, *Prior* and *Size*. The same happens for *More Types* except for the two lowest payoffs out of 12000. For *Distrib*, this happens for payoffs higher than 70.

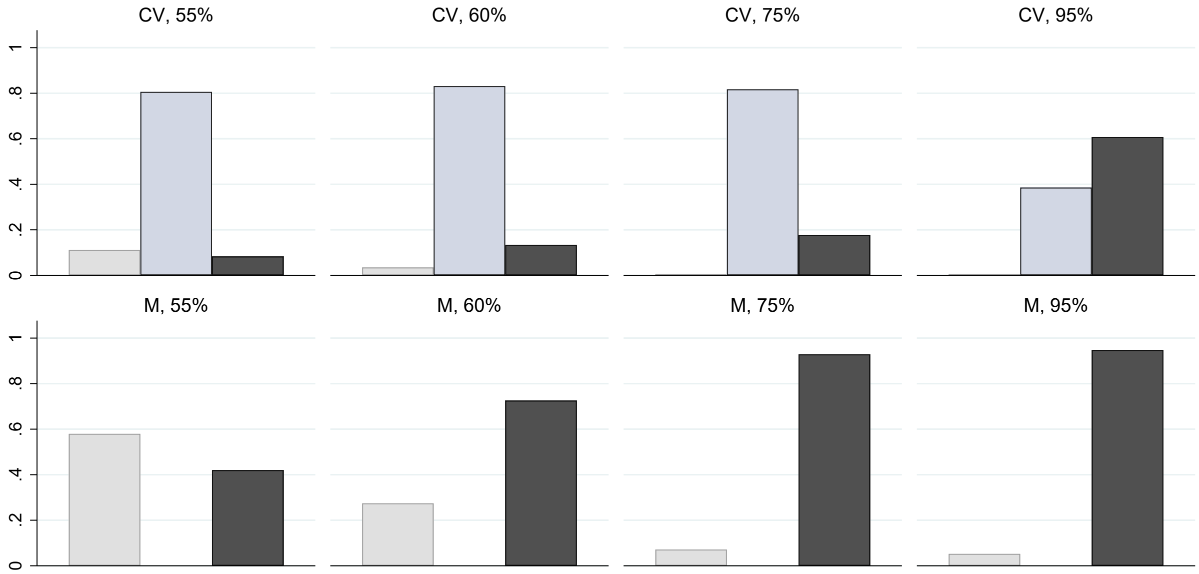

Figure 2: Basic aggregate behaviour by voting rule and signal precision. Full abstention (left, grey) indicates a weight of 0, no abstention (right, black) a weight with absolute value of 20, and partial abstention (middle, blue) indicates a weight with an absolute value strictly between 0 and 20.

4.2 Voting Behaviour

This section begins by examining voting behaviour in the symmetric treatments without communication. We then turn to the treatments with an asymmetric prior and communication in subsections 4.2.1 and 4.2.2. For clarity, data from blue and red signals are pooled.[20]

For CV to strictly outperform MV, it is essential that voters make use of partial abstention. In our experiment, subjects opt for partial abstention 73.94% of the time under CV. Both full abstention and full vote are significantly lower than under MV: 4.49% vs 24.25% and 21.56% vs 75.75% respectively.[21] Figure 2 highlights how voting behavior varies with information quality. Under both systems, full abstention decreases significantly as information quality improves, while the frequency of casting a full vote increases.[22] Under CV, partial abstention decreases with the quality of information.[23]

[20]Table D2 in the appendix displays the average weights under both voting systems for each environment, signal precision, and signal realization. It also includes tests of differences across signal realizations, based on linear regressions. We find no significant differences in 20 out of 26 comparisons.

[21]This pattern is consistent across environments and precisions. In the aggregate, the p-value< 0.01 for all environments. When looking for each environment and precision separately, all p-values< 0.1 except for the precision of 95% in the environment Distribution.

[22]See Table D3 in the Appendix, which reports linear regressions on the probability of "full abstention" and "full vote" and shows that full abstention significantly decreases with the precision, while full vote increases with it (under both mechanisms). This result is robust to the inclusion of covariates from the questionnaire.

[23]The regression reported in Table D3 shows that the frequency of a partial vote significantly decreases with the precision of the signal.

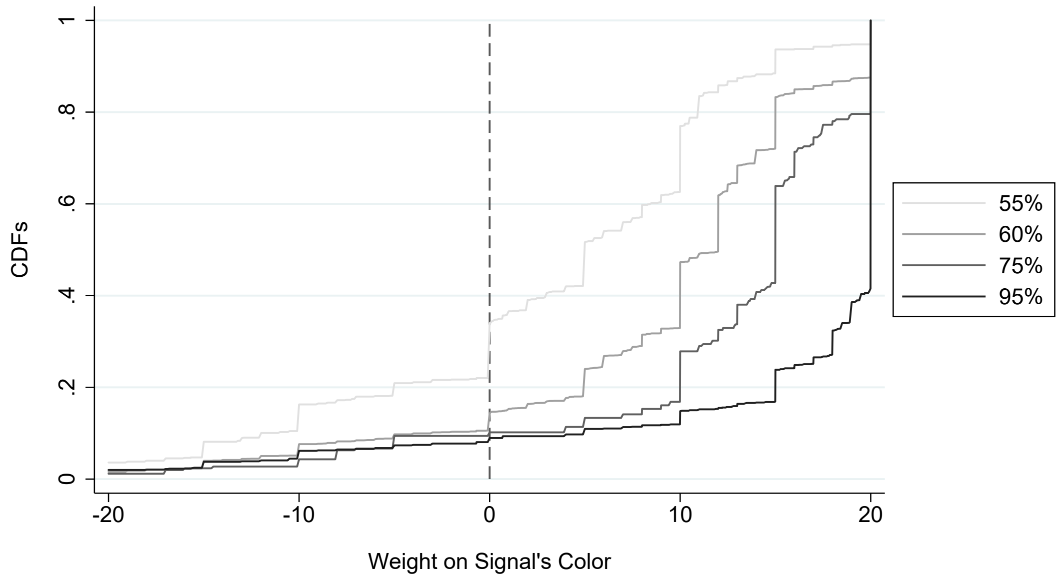

Figure 3: Cumulative distribution of weights by signal precision in the main treatments under CV.

Figure 3 gives a more detailed picture of voting behaviour under CV by showing the cumulative distribution of weights for different signal precisions. The data reveals a clear and consistent pattern: voters tend to assign higher weights to more precise signals. With only a few exceptions in the negative domain, the weight distributions for high-precision signals stochastically dominate those for lower precision signals.[24] The average weights for each signal and treatment displayed in Figure 4 further illustrate this pattern by showing the average observed behaviour for each signal in each symmetric treatment. Overall, the evidence supports Hypothesis 2: on average, under CV, participants place greater weight on more precise signals.[25]

A striking prediction under CV is that behaviour should not vary across symmetric environments. Figure 4 (and Figure C3 in the Appendix) shows that participants' behaviour is indeed remarkably similar across treatments. This consistency is particularly noteworthy given the between-subject design of the experiment: no participant experienced more than one treatment.[26] These findings provide support for Hypothesis 3.

[24]Figure C3 in the Appendix confirms that this pattern is consistent across all symmetric treatments. Similarly, Figure C4 shows that the pattern persists across both the first and second half of the block.

[25]All pairwise comparisons are significantly different ($p < 0.01$).

[26]We cannot reject the null hypothesis that weights are consistent across the four main treatments. However, when we include control variables from the questionnaire, we reject the null hypothesis of consistency across treatments for signals with 55% precision, primarily due to treatment *Distrib*, where the average weight is significantly higher than in the other treatments (4.95 vs 1.94, 2.2, and 1.74). When excluding treatment *Distrib*, we find no significant difference in weights ($p > 0.80$). The results are robust to considering relative rather than absolute weights. Detailed results are provided in Tables D4 and D5 in Appendix D.

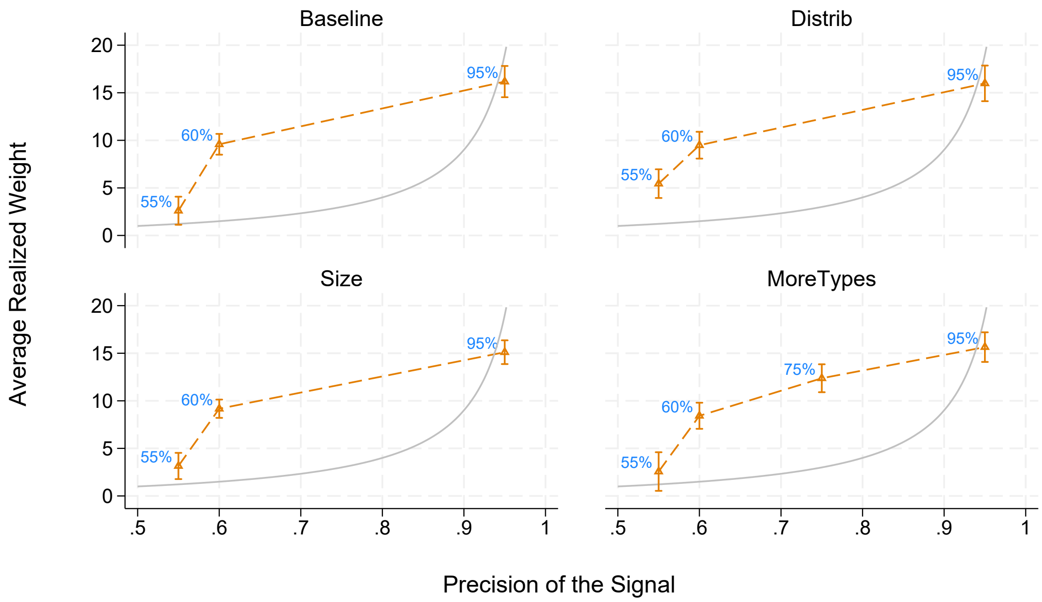

Figure 4: Average realized weight for the colour of the signal in the symmetric treatments disaggregated by treatment and by signal precision. The efficient equilibrium that assigns the maximum weight on the most informative signal is indicated by solid gray line.

While voting patterns appear largely consistent across treatments, we identify three clear deviations from the theoretical predictions outlined in Section 2 in terms of voting behaviour under CV. First, some participants vote for the colour opposite to their signal (see Figure 3).[27] The probability with which they do it decreases with the precision of the signal: on average, they vote against their signal with probabilities 22%, 11%, 9% and 8% for the precisions of 55%, 60%, 75% and 95% respectively. Second, we observe substantially greater variance than predicted. If all participants followed equilibrium strategies, we would expect step functions in the distribution of voting weights. Instead, Figure 3 reveals significant dispersion.[28] As a consequence, low-quality signals may carry disproportionately large weights, potentially having more impact on the decision than high-quality signals. For instance, participants with a precision of 60% choose the maximum weight of 20 for 12.44% of the cases, while participants with a precision of 95% choose a lower weight 41.55% of the time. Third, and perhaps most remarkably, as Figure 4 indicates, participants attach significantly higher weights than predicted for signals with intermediate precisions.[29]

[27] Voting against the signal is frequently observed in majority voting experiments on information aggregation. See, for example, Guarnaschelli et al. (2000); Bouton et al. (2017); Mengel and Rivas (2017); Mattozzi and Nakaguma (2023).

[28] This is not driven by different groups converging to different equilibria. While there is some heterogeneity among groups, the same qualitative finding is found across groups.

[29] A joint test of coefficients from a linear regression rejects that average weights are proportional to the

The latter deviation indicates that signals of intermediate precision are overweighted in group decisions, weakening the influence of more informative signals. One possible explanation is that individuals misjudge the informativeness of different signals. This aligns with recent findings by Agranov and Reshidi (2023), which show that participants often fail to fully account for the non-linearities required for accurate Bayesian updating. Instead, they tend to rely on an updating rule that only partially reflects these complexities, resulting in behaviour that falls between Bayesian and linear updating. In our data, we reject a linear relation of weights with respect to the precisions ($p < 0.01$). In fact, we find that weights are concave with respect to the precision. Relatedly, Augenblick et al. (2021) finds that individuals tend to overestimate the value of weak signals and underestimate the strength of more reliable ones. However, a key departure from their findings in our data is that overinference occurs primarily among subjects with intermediate-level signals (60% precision), whereas it is absent among those with the least informative signals (55% precision).[30]

Under MV, there is a multiplicity of pure-strategy equilibria in all environments but there is a unique double-symmetric payoff-dominant equilibrium for each environment (see Table D1 in the Appendix). Comparing these payoff dominant equilibria across environments, we should observe stark differences in behaviour. In the baseline treatment, all voters should cast their vote according to their signal, with no one abstaining. In the other main treatments, however, only voters with a precision of 75% or higher should vote, while the rest should abstain. Contrary to these predictions, the data reveal little variation in behaviour across treatments (see Figure D6 in the Appendix). This discrepancy may be attributed to the relatively small utility differences between equilibria. As shown in Table D1 in the Appendix, the probability of selecting the correct alternative differs by no more than 0.045 between the Pareto-dominant and Pareto-inferior equilibria across treatments. Similarly to what we observed under CV, and in line with Hypothesis 2, weights under MV tend to increase with signal precision. All pairwise comparisons are statistically significant, except between signals of 75% and 95% precision.[31]

4.2.1 Compensating for Asymmetries

When the prior is uneven, as in the *Asymmetric Prior* environment, voters need to compensate for the differing likelihoods of the two states, requiring stronger evidence to select the

log-likelihood ratios ($F_{3,47} = 41.64$, $p < 0.01$). All pairwise comparisons are significant with $p < 0.1$. If we add the covariates from the questionnaire, the general result holds but the pairwise comparisons of average weights with precisions 60%, 75% and 95% are no longer significant.

[30] See Benjamin (2019) for a comprehensive survey on biases in belief updating.

[31] The equality of behaviour between precisions of 75% and 95% is consistent with the equilibrium predictions reported in Table D1, where both types vote in the same manner across all equilibria.

less likely state. In this section, we assess the extent to which voters were able to compensate under both mechanisms. Table D2 in Appendix D displays the average weights for each mechanism, environment, precision and signal colour.

Consistent with Hypothesis 4, we find evidence of compensation under both mechanisms. Under CV, we find some evidence of over-compensation by voters in comparison to the theoretical predictions. On average, voters should compensate by adjusting their weights by 1.15 when voting for blue versus red. In the data, the average weight difference is 4.21. The difference in weights between blue and red signals for precisions of 55% and 60% in *Asymmetric Prior* are 3.43 and 4.17, respectively, which are larger than any other differences observed. However, these differences are not consistently significant. For the 55% precision, there is no significant difference in weight across colours in treatments without communication, and while the difference in the *Asymmetric Prior* is significantly larger than in the Baseline, it is not significantly different from other environments. With precision 60%, all pairwise comparisons are highly significant ($p < 0.01$), and we reject the null hypothesis that the differences are equal across treatments. At the highest precision, we observe no significant differences compared to other environments.

Under MV, we should also observe compensation in favour of red.[32] Figure C5 (in Appendix C) shows that, similar to the main treatments, voters mix at the aggregate level across all types. While the reaction is less pronounced than predicted, we observe differences across signal colours. As shown in Table D2 in Appendix D, the average weight for red signals is significantly higher with precisions 55% and 60% (but not for 95%). The magnitude of this effect is also sizeable: while the differences across signals in other environments and precisions do not exceed 2.72, the differences in this case are 5.03 and 5.62 for 55% and 60% respectively.[33]

4.2.2 The Effect of Communication

In this section, we examine the effect of communication on voting behaviour. As discussed in Section 2, there exist equilibria under both mechanisms in which voters share their private information with the group and vote according to the group posterior. We begin by examining whether participants reveal relevant information during the communication treatments

[32]According to the theoretical predictions, voters with a blue signal should only vote for the color of their signal if their precision is 95%, while those with a red signal should vote for red if their precision is 60% or higher, and abstain otherwise.

[33]We reject the null hypothesis that weight differences across colours are consistent across majority treatments without communication. For precisions of 55% and 60%, there are no significant differences between the *Asymmetric Prior* and *Baseline* environments. However, significant differences emerge when compared to other symmetric treatments without communication. At the highest precision, no significant differences are observed between the *Asymmetric Prior* and other environments.

and then assess the extent to which private information influences voting decisions after accounting for the group posterior.

Do participants reveal relevant information before the vote in the communication treatments? The answer is unequivocally yes. On average, groups exchange 10.40 messages per round. In 47.71% of these messages, participants discuss both the precision and the colour of their signals, while an additional 26.24% focus solely on the colour. Since CV has efficient equilibria even without communication, one might expect weakly higher levels of communication under MV. However, we find no economically significant differences between the mechanisms in terms of communication volume or types of messages.[34]

Next, we investigate whether the average voting weights reflect participants' private information or whether, conditional on the group posterior, these weights remain largely invariant across signals. Figure 5 presents the average weights assigned to the colour supported by the group posterior for all signals, separated by the strength of the posterior, under both mechanisms.[35] The most likely outcome is normalised to blue, indicating that blue signals align with the group posterior, whereas red signals do not. The figure reveals a clear pattern: conditional on a group posterior, there is little variation in average weights across different signals. Even when a signal contradicts the group posterior, its corresponding average weight is similar to that of a signal that aligns with the posterior.

To further quantify this relationship, we estimate the weight as a function of the log-likelihood of the signal and the log-likelihood of the group posterior. The results show that the coefficient for the log-likelihood of the signal is relatively small in magnitude and statistically insignificant under both mechanisms. This suggests that, once the group posterior is accounted for, private information has little to no influence on voting behaviour.

Our findings contrast with those in Guarnaschelli et al. (2000), who study communication through straw polls before voting in an information aggregation experiment with binary states and signals. In their setting, despite more than 90% of participants truthfully revealing their signals, their private information still significantly influences the final vote, leading to substantial differences in outcomes across mechanisms. In our experiment, however, private information does not significantly affect voting behaviour under either mechanism after controlling for the group posterior.[36]

[34]See Table D7 for a summary of message statistics across mechanisms.

[35]For comparability, weights under MV are normalised to $\{-20, 0, 20\}$.

[36]Relatedly, Goeree and Yariv (2011) and Le Quement and Marcin (2020) also examine the effect of communication on voting behaviour and outcomes. In contrast to us, they focus in a setting with heterogeneous preferences.

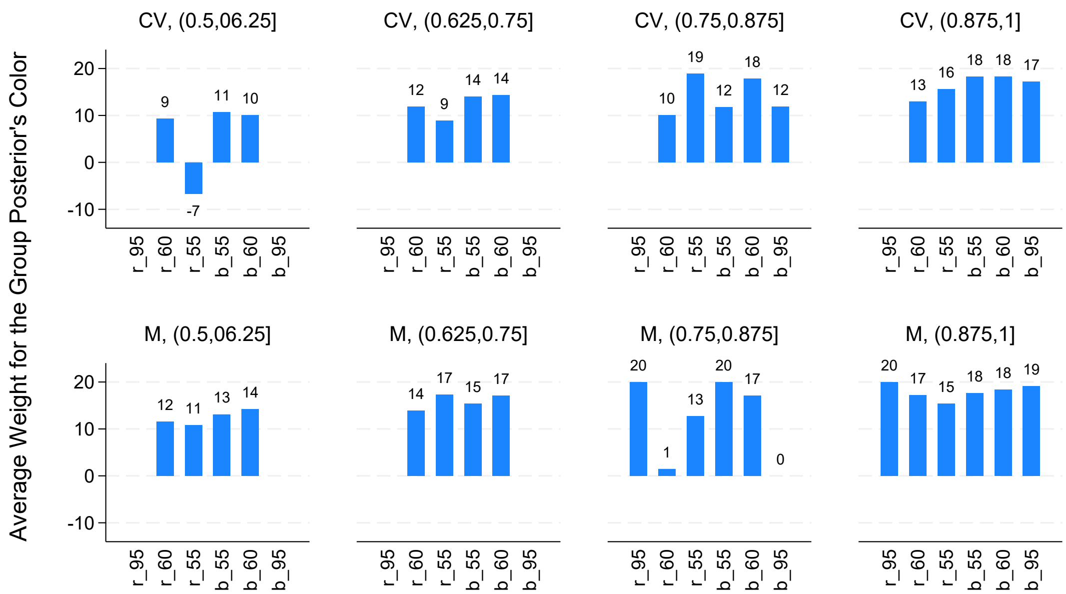

Figure 5: Average weights for each signal by mechanism and posterior. The most likely outcome is normalized to blue, meaning blue signals align with the group posterior, while red signals do not.

4.3 Choice of mechanisms

In part 3 of the experiment, subjects were asked to select a voting mechanism that would be used for 10 additional rounds. In a frictionless setting—where mechanisms impose no differences in cognitive effort or time, and preferences depend solely on expected payoffs—participants should unanimously opt for CV in the absence of communication. However, in sessions without communication, only 58.33% of subjects preferred CV over MV. As Figure 6 shows, support for CV varied across treatments but consistently exceeded that for MV in environments without communication. By contrast, under communication, where there are no clear theoretical predictions, around 88% of participants opted for MV.

What drives these preferences? To explore this question, we conduct an exploratory analysis using a linear probability model to predict the likelihood of selecting CV in part 3, as summarised in Table 3. Our findings indicate that realised payoffs play a significant role: higher realised payoffs under CV increase the likelihood of choosing it, while higher realised payoffs under MV have the opposite effect, with a similar magnitude. The effect is economically meaningful: a payoff difference of 10 (out of 100) corresponds to a 15 percentage point increase in the probability of selecting CV.[37]

[37]We obtain similar results when using simulated payoffs instead of realised payoffs in treatments without communication. This alternative measure mitigates the impact of random variation due to limited observations. However, it is not observed by subjects, and constructing simulated payoffs under communication is not straightforward.

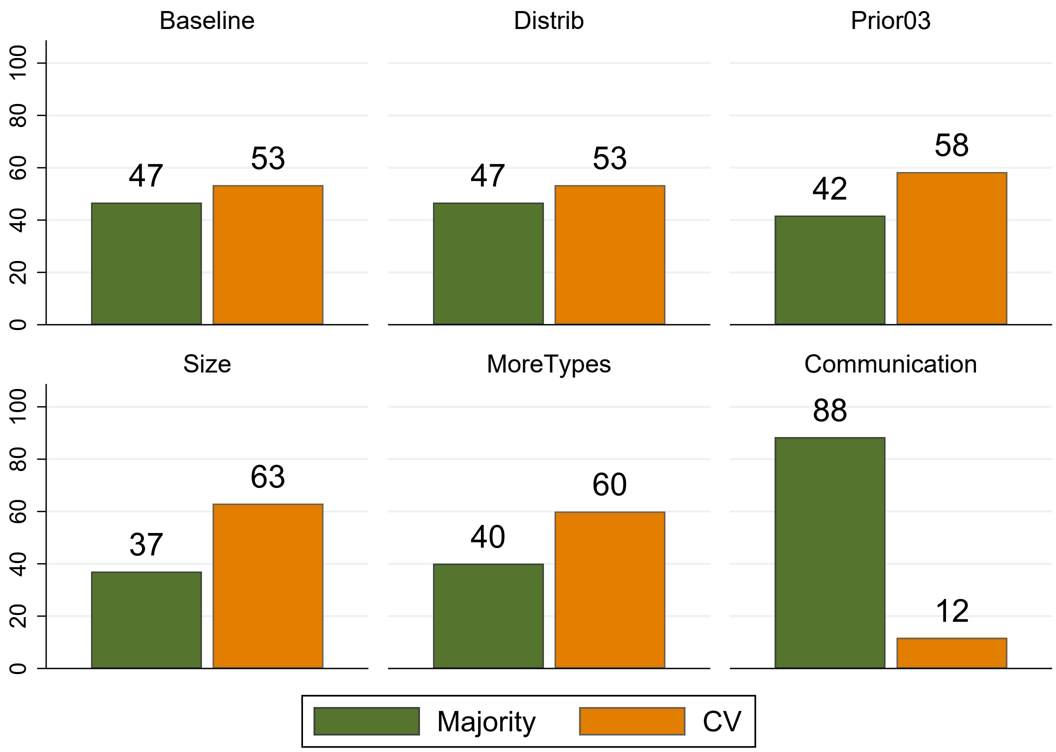

Figure 6: Support for each mechanism in part 3 of the experiment.

By contrast, we find no robust or economically significant effects for other potential determinants, including group decision time, cognitive complexity, and mechanism order. While decisions under CV took 28% longer on average, this had no systematic impact on preferences. Likewise, cognitive ability—proxied by control question completion time—shows no clear effect, nor does the order in which participants experienced the mechanisms. The only other strong predictor is communication: when participants can discuss before voting, support for CV drops significantly.

Dep. Var.: System Choice	(1)	(2)	(3)	(4)	(5)	(6)
Payoff CV	0.015***	0.015***	0.016***	0.016***	0.016***	0.017***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Payoff MV	-0.018***	-0.018***	-0.016***	-0.016***	-0.016***	-0.014***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Time CV			-0.004	-0.001	-0.002	0.000
			(0.004)	(0.008)	(0.009)	(0.007)
Time MV			-0.014**	-0.017*	-0.016	0.006
			(0.006)	(0.010)	(0.012)	(0.010)
Time Control Quest. CV				-0.084	-0.089	-0.121*
				(0.070)	(0.073)	(0.068)
Time Control Quest. MV				-0.018	-0.011	-0.039
				(0.060)	(0.062)	(0.061)
Order (CV First)					0.021	0.107
					(0.126)	(0.106)
Communication						-0.450***
						(0.086)
Constant	0.662**	0.715*	0.695*	0.773*	0.767*	0.388
	(0.274)	(0.386)	(0.391)	(0.391)	(0.390)	(0.310)
Questionnare Controls		✓	✓	✓	✓	✓
Observations	408	408	408	408	408	408
Clusters	72	72	72	72	72	72
R-squared	0.234	0.247	0.270	0.275	0.275	0.324

Table 3: Linear regression of the probability of voting for CV in part 3. Standard errors are clustered at the matching group level.

5 Conclusions

In this paper, we present a laboratory experiment in which participants endogenously determine the weight of their votes. Our findings reveal that welfare under CV is generally higher than under MV, though the observed difference is smaller than theoretical predictions suggest. When free communication is allowed, the performance gap between the two mechanisms disappears. In terms of voting behaviour we find that, while the main comparative statics of the model are broadly supported by the data, there are notable deviations. The most significant is that voters with intermediately informative signals tend to assign disproportionately high weights to their votes, diluting the influence of highly informative signals.

This study opens several avenues for future research. One potential direction is to examine CV in asymmetric settings, where it is expected to outperform majority voting even without differences in voter precision. Another promising area is testing the mechanisms in more natural settings where participants may be uncertain about their own precision or the information technology of others. In our controlled experiment, confidence and performance were necessarily linked, but in more natural environments, confidence may not accurately reflect actual performance. This discrepancy could have important implications for the information-aggregating properties of both mechanisms (see, e.g., Kartal and Tyran 2022; Enke et al. 2023). Investigating how CV and MV perform under these conditions would offer valuable insights into the robustness and real-world applicability of both systems.

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A Proofs

A.1 Proof of Proposition 2

We start by establishing the following key lemma, where we use the notation $\hat{\sigma}_i(t_i)$ to denote a possible realization of the random variable $\sigma_i(t_i)$.

Lemma 1. *For any profile σ, interim utilities associated to each action are such that:*

- $U_i(1 \mid t_i) - U_i(0 \mid t_i)$ *is increasing in t_i, and strictly so whenever* $\Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) \in \{-1, 0\}) > 0$.
- $U_i(0 \mid t_i) - U_i(-1 \mid t_i)$ *is increasing in t_i, and strictly so whenever* $\Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) \in \{0, 1\}) > 0$.

Proof. We write the proof for the first bullet point (the remaining one follows a similar argument). Noting $\Delta_i(t_i) := U_i(1 \mid t_i) - U_i(0 \mid t_i)$ for the difference of (expected) interim utilities, we have:

$$
\begin{aligned}
\Delta_i(t_i) = \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = 0 \mid t_i) \mathbb{E}\left[\frac{u_i(A) - u_i(B)}{2} \mid t_i, \sum_{j \neq i} \hat{\sigma}_j(t_j) = 0\right] + \\
\Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = -1 \mid t_i) \mathbb{E}\left[\frac{u_i(A) - u_i(B)}{2} \mid t_i, \sum_{j \neq i} \hat{\sigma}_j(t_j) = -1\right] \\
= \sum_{k=-1}^{0} \frac{1}{2} \sum_{t_{-i} \in T^{n-1}} \Pr(t_{-i} \mid t_i) \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = k)(Pr(\alpha \mid t_i, t_{-i}) - Pr(\beta \mid t_i, t_{-i})) \\
= \sum_{k=-1}^{0} \frac{1}{2} \sum_{t_{-i} \in T^{n-1}} \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = k) \frac{\Pr(t_i, t_{-i})}{\Pr(t_i)} \left(\frac{Pr(\alpha, t_i, t_{-i})}{\Pr(t_i, t_{-i})} - \frac{Pr(\beta, t_i, t_{-i})}{\Pr(t_i, t_{-i})}\right) \\
= \sum_{k=-1}^{0} \frac{1}{4} \sum_{t_{-i} \in T^{n-1}} \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = k) \left(\frac{Pr(t_i, t_{-i} \mid \alpha)}{\Pr(t_i)} - \frac{Pr(t_i, t_{-i} \mid \beta)}{\Pr(t_i)}\right) \\
= \sum_{k=-1}^{0} \frac{1}{4} \sum_{t_{-i} \in T^{n-1}} \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = k) \left(Pr(t_{-i} \mid \alpha) \frac{Pr(t_i \mid \alpha)}{\Pr(t_i)} - Pr(t_{-i} \mid \beta) \frac{Pr(t_i \mid \beta)}{\Pr(t_i)}\right) \\
= \sum_{k=-1}^{0} \frac{1}{2} \sum_{t_{-i} \in T^{n-1}} \Pr(\sum_{j \neq i} \hat{\sigma}_j(t_j) = k) \left(Pr(t_{-i} \mid \alpha) \frac{t_i}{1 + t_i} - Pr(t_{-i} \mid \beta) \frac{1}{1 + t_i}\right).
\end{aligned}
$$

This concludes the proof of the lemma. □

To conclude the proof of Proposition 2, let σ be a non-trivial equilibrium. If i is a voter such that $\sigma_i(t_i)$ is a singleton independent from t_i, then she follows a monotone cutoff strategy.

Consider now i such that there exists t_i, t_i' with $\Pr(\hat{\sigma}_i(t_i) \neq \hat{\sigma}_i(t_i')) > 0$, we say that i is a switcher. As σ is a non-trivial equilibrium such that (i) votes are independent across voters, and (ii) votes cannot differ by more than 2 for any given voter, we have two cases to consider:

- if $\Pr(\sum_{j\in N} \hat{\sigma}_j(t_j) = 0) > 0$, as i is a switcher, it must be the case that either $\Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = 0) > 0$ (this happens if i plays 0 with positive probability) or $\Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = -1) \Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = 1) > 0$ (this happens if i only plays -1 and 1 with positive probability). In both cases, we have that $U_i(1 \mid t_i) - U_i(0 \mid t_i)$ and $U_i(0 \mid t_i) - U_i(-1 \mid t_i)$ are strictly increasing in t_i by Lemma 1. As σ is an equilibrium, σ_i must be a monotone cutoff strategy.

- if $\Pr(\sum_{j\in N} \hat{\sigma}_j(t_j) = 0) = 0$, then $\Pr(\sum_{j\in N} \hat{\sigma}_j(t_j) = -1) \Pr(\sum_{j\in N} \hat{\sigma}_j(t_j) = 1) > 0$. As i is a switcher, we have that either $\Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = -1) \Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = 1) > 0$ (this happens if i plays 0 with positive probability) or $\Pr(\sum_{j\neq i} \hat{\sigma}_j(t_j) = 0) > 0$ (this happens if i only plays -1 and 1 with positive probability). As for the previous case, it follows that σ_i must be a monotone cutoff strategy.

We have thus established that any non-trivial equilibrium must be in monotone cutoff strategies.

To conclude, we show that a non-trivial equilibrium exists. Consider first the case with n odd, that is $n = 2q + 1$. Consider the strategy profile σ where q voters always vote 1, q voters always vote -1 and the last voter i follows her signal, that is $\sigma_i(t_\alpha^p) = 1$ and $\sigma_i(t_\beta^p) = -1$ for all $p \in P$. This strategy profile is such that $U_i(\sigma) > 1/2$. By the argument of McLennan (1998), the best strategy profile τ must be an equilibrium and it must be such that $U_i(\tau) \geq U_i(\sigma) > 1/2$. Hence it must be that τ is a non-trivial equilibrium (otherwise the expected utility would be 1/2, a contradiction). Finally, a similar argument can be made when n is even. We conclude that a non-trivial equilibrium always exists.

A.2 Proof of Proposition 3

Proof. Consider first the case where n is even, that is $n = 2q$. Assume that an efficient equilibrium σ exists. Let $p, p' \in P$ be such that $p < p'$. Let $\mathbf{t_{-i}}$ be a type profile such that q voters receive t_β^p, while $(q-1)$ voters receive t_α^p. By efficiency of σ, we must have $\Pr(\hat{\sigma}_i(t_\alpha^{p'}) + \sum_j \hat{\sigma}_j(t_j) > 0) = 1$, as A must be chosen if i receives a type $t_\alpha^{p'}$, and $\Pr(\hat{\sigma}_i(t_\beta^p) + \sum_j \hat{\sigma}_j(t_j) < 0) = 1$, as B must be chosen if i receives a signal t_β^p. Hence, it must be that $\sigma_i(t_\alpha^{p'}) = 1$ and $\sigma_i(t_\beta^p) = -1$. Consequently, for a signal profile s such that q voters receive s_β^p, while q voters receive $t_\alpha^{p'}$, we have $\sum_{i\in N} \sigma_i(t_i) = 0$, while efficiency requires $\sum_{i\in N} \sigma_i(t_i) > 0$. We thus obtain a contradiction.

Consider now the case where n is odd, that is $n = 2q + 1$. Assume that an efficient equilibrium σ exists. Let $p := \min P$ and $p' := \max P > p$. Consider a type profile $\mathbf{t^0}$ such that q voters receive $t_\alpha^{p'}$ while $(q+1)$ voters receive t_β^p. Observe that $\Pr(\alpha \mid \mathbf{t^0}) > 1/2$ if and only if

$$\left(\frac{p'}{1-p'}\right)^q > \left(\frac{p}{1-p}\right)^{q+1} \quad \Leftrightarrow \quad q > \frac{\ln(\frac{p}{1-p})}{\ln(\frac{p'(1-p)}{(1-p')p})} := q(P).$$

Let $n(P) := 2\lfloor q(P) \rfloor + 3$ and assume $n \geq n(P)$, so that $q > q(P)$. Consider a family of type profiles $\mathbf{t^k}$ for $k \in \{0, \ldots, q\}$ such that $(q+1)$ voters receive t_β^p, k voters receive t_α^p and $(q-k)$ voters receive $t_\alpha^{p'}$. The sequence $\Pr(\alpha \mid \mathbf{t^k})$ is strictly decreasing, and as $n > n(P)$, it holds that $\Pr(\alpha \mid \mathbf{t^0}) > 1/2 > \Pr(\alpha \mid \mathbf{t^q})$.

There exists $k \in \{0, \ldots, q-1\}$ such that $\Pr(\alpha \mid \mathbf{t^k}) \geq 1/2 \geq \Pr(\alpha \mid \mathbf{t^{k+1}})$ with at least one strict inequality. Without loss of generality, we can assume that $\Pr(\alpha \mid \mathbf{t^k}) > 1/2 \geq \Pr(\alpha \mid \mathbf{t^{k+1}})$ and we can further assume that $\Pr_\sigma(B \mid \mathbf{t^{k+1}}) > 0$ (otherwise, if $\Pr(\alpha \mid \mathbf{t^k}) > 1/2 = \Pr(\alpha \mid \mathbf{t^{k+1}})$ and $\Pr_\sigma(B \mid \mathbf{t^{k+1}}) = 0$, we can apply the argument to $\mathbf{t^{k+1}}$ and $\mathbf{t^{k+2}}$, which are such that $\Pr(\alpha \mid \mathbf{t^{k+1}}) = 1/2 > \Pr(\alpha \mid \mathbf{t^{k+2}})$ and $\Pr_\sigma(A \mid \mathbf{t^{k+1}}) = 1 > 0$). As $\Pr_\sigma(B \mid \mathbf{t^{k+1}}) > 0$, we must have $\Pr(\sum_{i \in N} \hat{\sigma}_i(t_i^{k+1}) \leq 0) > 0$. As σ is efficient, we must also have $\Pr(\sum_{i \in N} \hat{\sigma}_i(t_i^k) > 0) = 1$. Hence, for any voter i, it must hold that $\Pr(\hat{\sigma}_i(t_\alpha^{p'}) > \hat{\sigma}_i(t_\alpha^p)) > 0$, so that $\Pr(\hat{\sigma}_i(t_\alpha^p) \leq 0) > 0$.

Consider now the type profile $\mathbf{t}$ for which all voters receive the type t_α^p. We have $\Pr_\sigma(B \mid \mathbf{t}) > 0$ and $\Pr(\alpha \mid \mathbf{t}) > 1/2$, a contradiction with the assumption that σ is efficient.

To conclude, if n is even, or if n is odd with $n \geq n(P)$, there is no efficient equilibrium. □

To complement the proof, we first plot the value of $n(P)$ as a function of the minimal and maximal precisions of P.

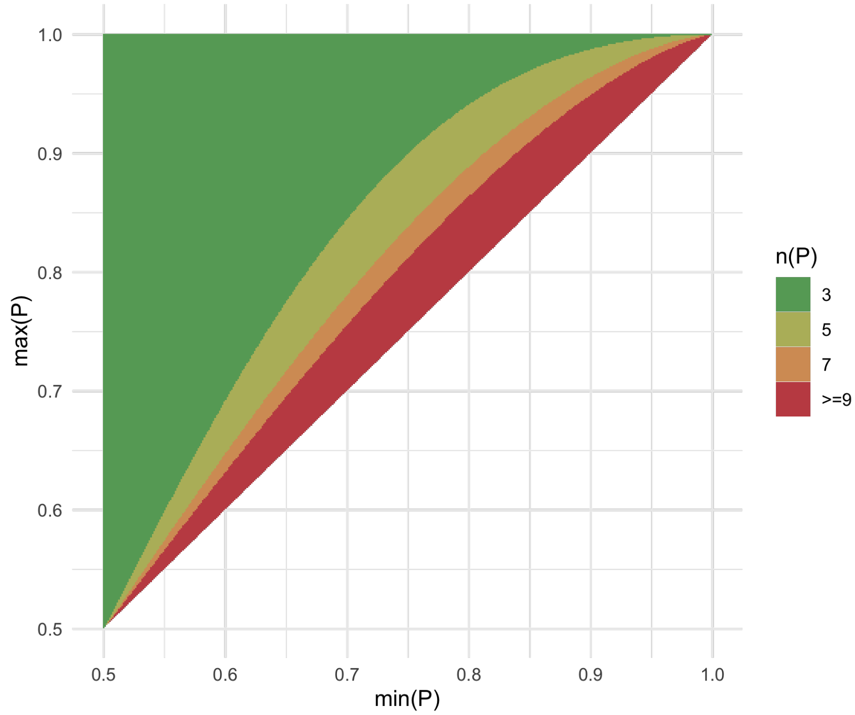

Figure A1: Bound $n(P)$ as a function of minimal and maximal precisions.

We observe that $n(P)$ is typically quite low. When the prior is even, CV strictly dominates MV for committees of at least 5 voters provided that the highest and lowest precisions differ by at least 0.1.

Finally, for the Asymmetric Prior treatment (A), we observe that the same reasoning as in the proof of Proposition 3 can be applied. This derives directly from the observation that

$$\Pr(\alpha \mid s_\alpha^{0.55}, s_\alpha^{0.55}, s_\alpha^{0.55}, s_\beta^{0.55}, s_\beta^{0.55}) < 1/2 < \Pr(\alpha \mid s_\alpha^{0.95}, s_\alpha^{0.55}, s_\alpha^{0.55}, s_\beta^{0.55}, s_\beta^{0.55}).$$

B Questionnaire Data

In this section we describe the data collected in the questionnaire at the end of the experiment (see Table B1) and show how these vary across treatments (see Table B2). Variables Party and Religion were not included in the regressions in Appendix D.

Variable	Description
Gender	Female = 1; Male = 0
Age	Age in years
Economics	= 1 if the major is Economics. Originally, this was a categorical variable with the options "Law" (9.07%), "Economics" (14.95%), "Philology / Literature" (2.45%), "Physics/Chemistry/Biology" (2.70%), "Engineering" (17.40%), "History" (1.23%), "Politics" (1.72%), "Mathematics" (1.23%), "Others" (49.26%).
Year	Years of studies.
Religiosity	Degree of religiosity. Likert scale from 1 to 4.
Religion	Categorical variable: Christian (53.19%), Hinduist (0), Muslim (1.23), No religion (37.99), Other Religion (1.47), Prefer not to answer (6.13). Not included in the regressions.
Politics	Interest in Politics. Likert scale from 1 to 4.
Party	Categorical variable: Podemos (16.67%), PP (14.71%), PSOE (12.01%), EUPV-EV (2.94%), UPvD (1.23%), Primavera (0.98%), Others (31.86%), Dk/Na (19.61%) Not included in the regressions.
Risk	Tendency to take risks. Likert scalefrom 1 to 5.
Trust	Tendency to trust people. Likert scale from 1 to 5.
Experienced	= 1 if the subject has participated in 4 or more experiments. Originally, this was a categorical variable about participation in previous experiments: "Never", "1-3", "4-6", and "More than 6".
Siblings	Number of siblings.

Table B1: Description of variables in the questionnaire data.

	Baseline	Distrib	Prior03	Size	MoreTyp	Comm.	p-value
Gender	0.62	0.67	0.62	0.54	0.48	0.62	0.31
Age	20.90	20.58	21.07	20.80	19.93	20.78	0.01
Economics	0.13	0.17	0.18	0.13	0.18	0.12	0.83
Year	3.05	2.87	3.28	2.95	2.52	3.00	0.11
Religiosity	0.65	0.68	0.68	0.70	0.67	0.68	1.00
Politics	1.50	1.48	1.47	1.52	1.58	1.78	0.17
Left wing	0.37	0.37	0.33	0.31	0.27	0.40	0.67
Risk	2.67	2.57	2.63	2.65	2.72	2.48	0.66
Trust	2.40	2.52	2.28	2.57	2.38	2.43	0.58
Experience	0.50	0.28	0.38	0.41	0.37	0.33	0.22
Siblings	1.40	1.28	1.27	1.33	1.18	1.13	0.68

Table B2: Summary statistics by environment groups. The last column reports the p-value of an F-test of equality across treatments.

C Additional Figures

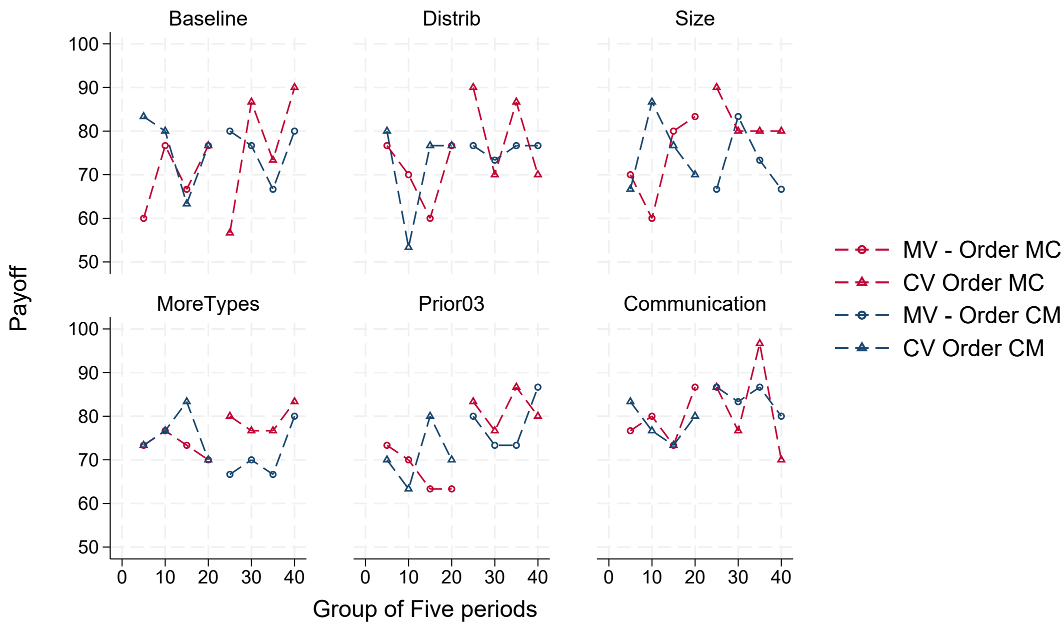

Figure C1: Temporal evolution of average payoffs. 'MC' denotes groups that used MV in Part 1 and CV in Part 2, while 'CM' refers to groups that experienced the reverse order.

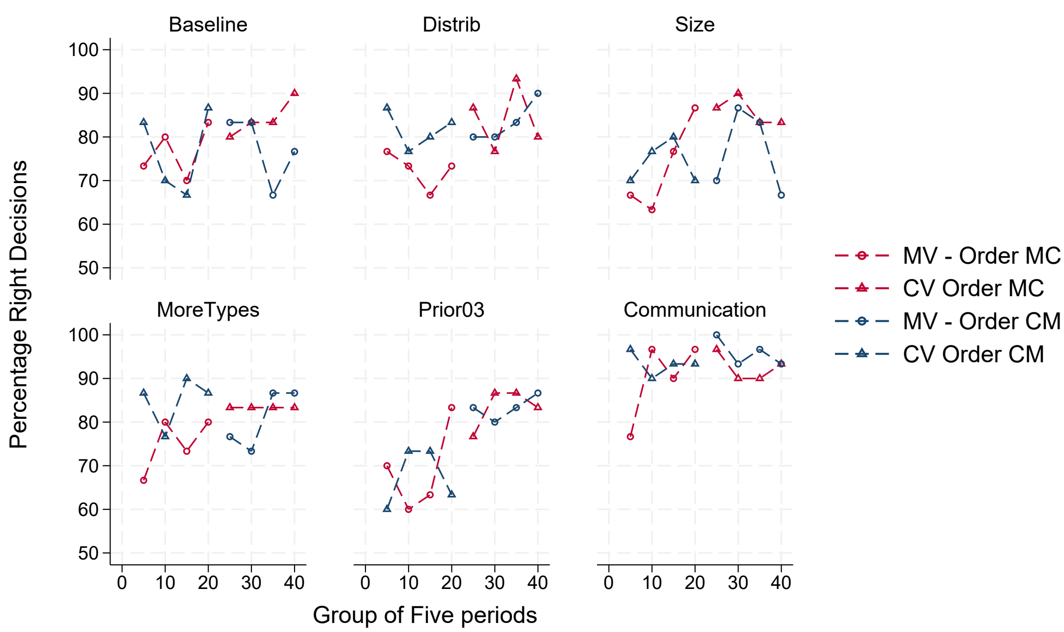

Figure C2: Temporal evolution of percentage of adopting the right decision at the group level. 'MC' denotes groups that used MV in Part 1 and CV in Part 2, while 'CM' refers to groups that experienced the reverse order.

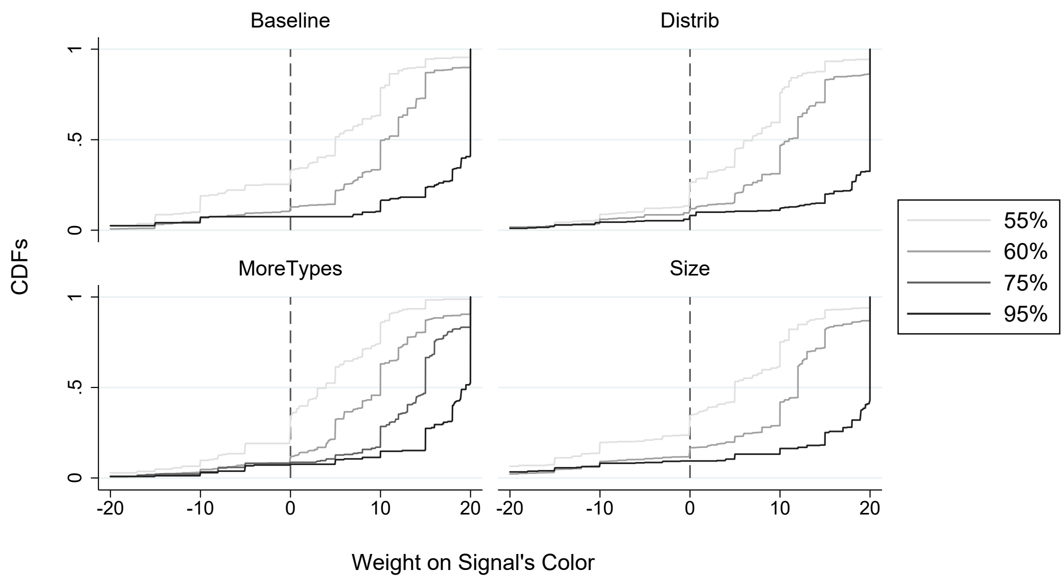

Figure C3: Cumulative distribution of weights by signal precision in the symmetric treatments.

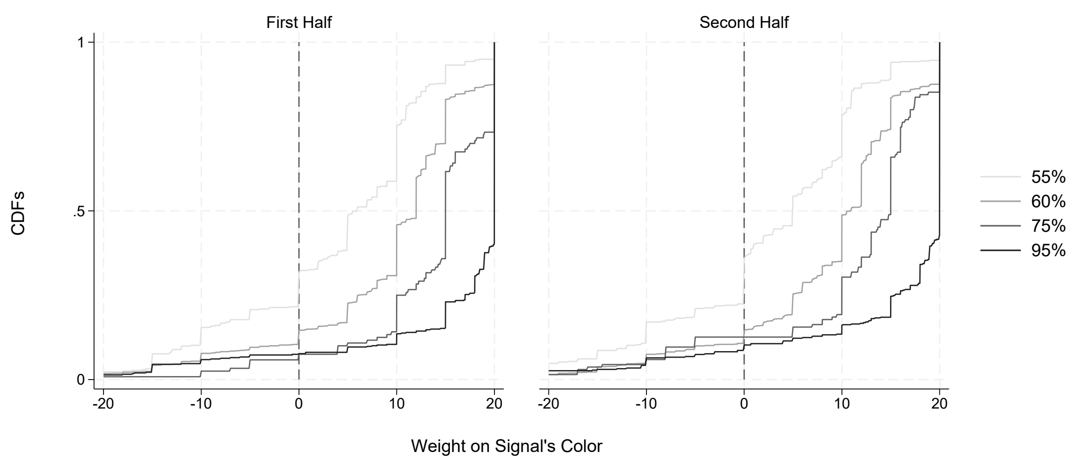

Figure C4: Cumulative distribution of weights by signal precision in the symmetric treatments, separated by the first half of the block and the second one.

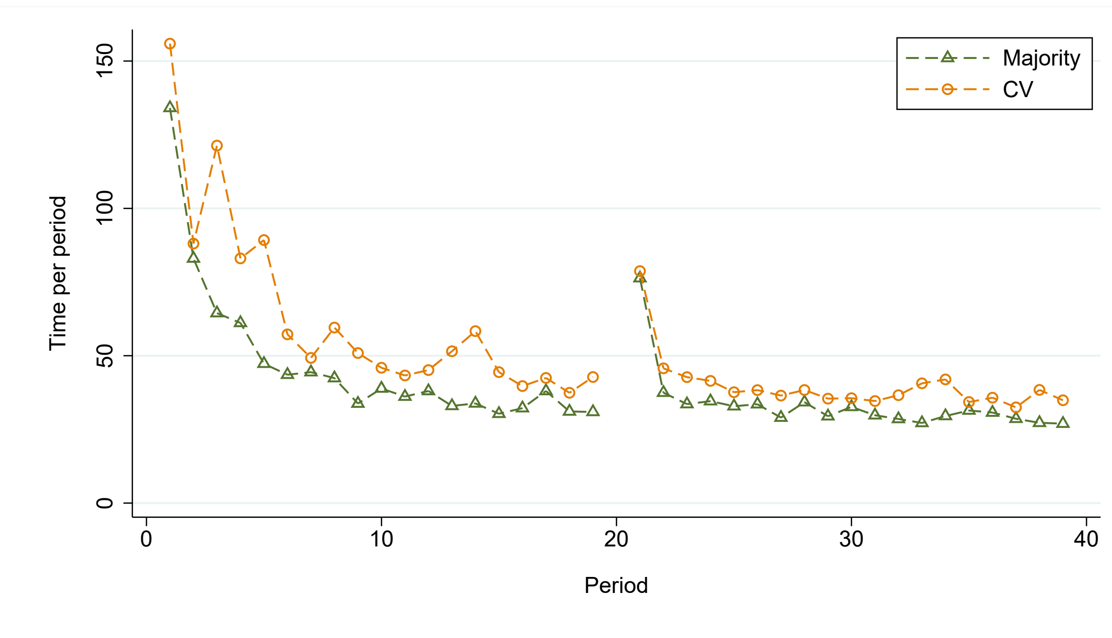

Figure C5: Time to finish each period for each mechanism in parts 1 and 2.

D Additional Tables

	Min Prec Vote			
	55%	60%	75%	95%
Baseline	**0.757**	0.754	–	0.751
Distribution	0.802	No eq.	–	**0.848**
Size	0.820	0.820	–	**0.852**
More Types	0.868	0.871	**0.897**	No eq.

Table D1: Pure-strategy double-symmetric equilibria in the symmetric treatments under majority rule, along with their expected payoffs. *Min Prec Vote* denotes the minimum precision level at which subjects vote, with those having lower precision choosing to abstain. The equilibrium that is Pareto-efficient is highlighted in bold.

		Av Weight CV				Av Weight MV			
Environment	Prec.	s_b	s_r	dif	p-value	s_b	s_r	dif	p-value
Baseline	55	3.32	1.55	1.77	0.319	-0.27	2.45	2.72	0.341
	60	9.87	9.31	0.56	0.246	11.52	13.26	1.74	0.220
	95	16.53	15.82	0.72	0.503	18.20	19.18	0.97	0.485
Distrib	55	5.75	5.20	0.55	0.665	5.52	3.50	2.02	0.210
	60	9.40	9.57	0.16	0.818	11.90	11.59	0.31	0.767
	95	15.78	16.23	0.45	0.709	19.43	18.19	1.24	0.025
Size	55	2.66	3.69	1.03	0.524	1.66	0.94	0.72	0.668
	60	9.39	8.94	0.45	0.554	11.24	11.74	0.50	0.384
	95	14.12	16.04	1.92	0.054	13.82	15.89	2.07	0.043
MoreTypes	55	1.58	3.74	2.16	0.058	1.84	0.19	1.65	0.403
	60	9.11	7.80	1.31	0.098	10.36	10.87	0.51	0.425
	75	12.33	12.40	0.07	0.945	17.32	16.75	0.57	0.724
	95	14.20	17.01	2.82	0.049	16.67	16.63	0.03	0.975
Prior	55	2.02	5.44	3.43	0.200	1.28	6.32	5.03	0.037
	60	7.27	11.45	4.17	0.011	11.32	16.94	5.62	0.018
	95	15.40	17.10	1.70	0.407	14.74	16.25	1.51	0.595
Comm.	55	3.60	2.78	0.81	0.784	4.76	4.05	0.71	0.769
	60	5.95	6.89	0.94	0.536	6.46	7.55	1.09	0.670
	95	16.69	17.40	0.72	0.563	19.04	17.18	1.86	0.185

Table D2: Average weight for each mechanism, environment, precision and signal color. *dif* displays the absolute difference and *p-value* displays the statistical signifficant of the difference based on linear regressions.

	Full Vote				Full Abstention				Partial Abstention	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)
Precision	1.286***	1.296***	0.910***	0.918***	-0.159***	-0.158***	-0.910***	-0.918***	-1.127***	-1.138***
	(0.078)	(0.079)	(0.057)	(0.058)	(0.037)	(0.038)	(0.057)	(0.058)	(0.069)	(0.068)
Gender		-0.018		0.118***		-0.033**		-0.118***		0.051
		(0.030)		(0.026)		(0.015)		(0.026)		(0.033)
Age - 18		0.015		0.010		-0.007**		-0.010		-0.008
		(0.010)		(0.010)		(0.004)		(0.010)		(0.011)
Years Stud.		-0.018		-0.002		0.004		0.002		0.014
		(0.015)		(0.015)		(0.005)		(0.015)		(0.016)
Risk		-0.019		-0.027		0.008		0.027		0.011
		(0.015)		(0.016)		(0.008)		(0.016)		(0.017)
Trust		0.006		-0.041***		0.003		0.041***		-0.009
		(0.013)		(0.015)		(0.009)		(0.015)		(0.014)
Experiments		0.022		-0.036**		0.008		0.036**		-0.030
		(0.016)		(0.013)		(0.012)		(0.013)		(0.022)
Politics		-0.008		-0.004		-0.004		0.004		0.012
		(0.016)		(0.019)		(0.012)		(0.019)		(0.017)
Siblings		0.010		0.001		0.005		-0.001		-0.015
		(0.016)		(0.015)		(0.007)		(0.015)		(0.018)
religiosity		0.009		0.021		0.008		-0.021		-0.017
		(0.018)		(0.015)		(0.016)		(0.015)		(0.024)
Constant	-0.632***	-0.616***	0.159***	0.280***	0.150***	0.131**	0.841***	0.720***	1.482***	1.485***
	(0.055)	(0.092)	(0.051)	(0.090)	(0.033)	(0.064)	(0.051)	(0.090)	(0.049)	(0.109)
Mechanism	CV	CV	MV	MV	CV	CV	MV	MV	CV	CV
Observations	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760
Clusters	48	48	48	48	48	48	48	48	48	48
R-squared	0.189	0.199	0.086	0.128	0.011	0.025	0.086	0.128	0.127	0.140

Table D3: Linear regression of the probability of full abstention, full vote and partial vote in symmetric environments. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Without Covariates		Including Covariates	
Precisions	All Environ.	All but *Distrib*	All Environ.	All but *Distrib*
55%	0.104	0.874	0.072	0.819
60%	0.716		0.923	
95%	0.826		0.781	

Table D4: Test of equality of average weights under CV in symmetric treatments without communication based on linear regressions.

	All Symm. CV Treats			All Without Distrib		
		60%	55%		60%	55%
Without Covariates	95%	0.909	0.108	95%	0.766	0.780
	60%		0.029	60%		0.849
	Joint test		0.047	Joint test		0.981
		60%	55%		60%	55%
With Covariates	95%	0.936	0.131	95%	0.812	0.771
	60%		0.123	60%		0.786
	Joint test		0.085	Joint test		0.985

Table D5: Test of equality of ratio of weights of signals of different precisions among symmetric treatments without communication. Based on linear regressions.

	Precision	Blue Signal			Red Signal		
		Signal	Against	Abstent.	Signal	Against	Abstent.
Baseline	55%	51.45	26.59	21.97	43.71	23.95	32.34
	60%	79.34	10.05	10.62	82.02	9.48	8.50
	95%	94.48	5.52	0.00	95.81	4.19	0.00
Distrib	55%	60.42	11.66	27.92	58.66	18.24	23.10
	60%	78.02	9.55	12.43	77.27	9.56	13.17
	95%	93.82	5.82	0.36	95.00	4.38	0.63
Size	55%	49.12	23.10	27.78	48.48	23.03	28.48
	60%	78.19	10.58	11.24	77.18	11.10	11.71
	95%	86.65	12.46	0.89	89.72	9.35	0.93
MoreTypes	55%	48.74	23.62	27.64	48.95	20.53	30.53
	60%	75.81	8.75	15.44	76.72	10.17	13.10
	75%	90.18	8.48	1.34	91.15	7.69	1.15
	95%	88.89	8.77	2.34	91.71	5.70	2.59
Prior	55%	51.59	29.94	18.47	59.02	21.86	19.13
	60%	74.71	16.52	8.77	91.07	4.84	4.09
	95%	90.18	8.93	0.89	91.81	5.60	2.59
Communication	55%	61.15	38.85	0.00	57.67	40.49	1.84
	60%	65.60	33.60	0.80	68.44	30.64	0.92
	95%	96.67	3.33	0.00	93.87	5.52	0.61

Table D6: Frequencies of voting the signal, voting against or abstaining under Majority for each signal precision and signal realization in each treatment.

	MV	CV	Overall
Average # of Messages per round	10.88	10.40	10.64
% Precision is mentioned	48.85	51.51	50.18
% Color is mentioned	70.90	73.94	72.42
% Both Precision and Color are mentioned	42.40	47.71	45.05

Table D7: Summary statistics of the chats in the communication treatments.

E Optimal Decisions By Group Posterior

The probability of making the right choice reported in section 4.1 aggregates mistakes of very different natures. Some mistakes are more costly than others: mistakes when there is massive evidence in favour of one of the states is more costly than when the posterior is very close to 0.5. Figure E1 disaggregates the probability of right decision by posteriors. In order to circumvent the limitation of the small number of observations for some of the posteriors, we provide simulations results based on observed behaviour for all treatments without communication.[38] We separate posteriors in five regions: $[0, 0.1]$, $(0.1, 0.4)$, $[0.4, 0.6]$, $(0.6, 0.9)$, and $[0.9, 1]$. The figure shows two regularities. First, CV tends to perform better across most posterior ranges. Second, under both mechanisms, the probability of a correct decision increases when posteriors are more extreme.

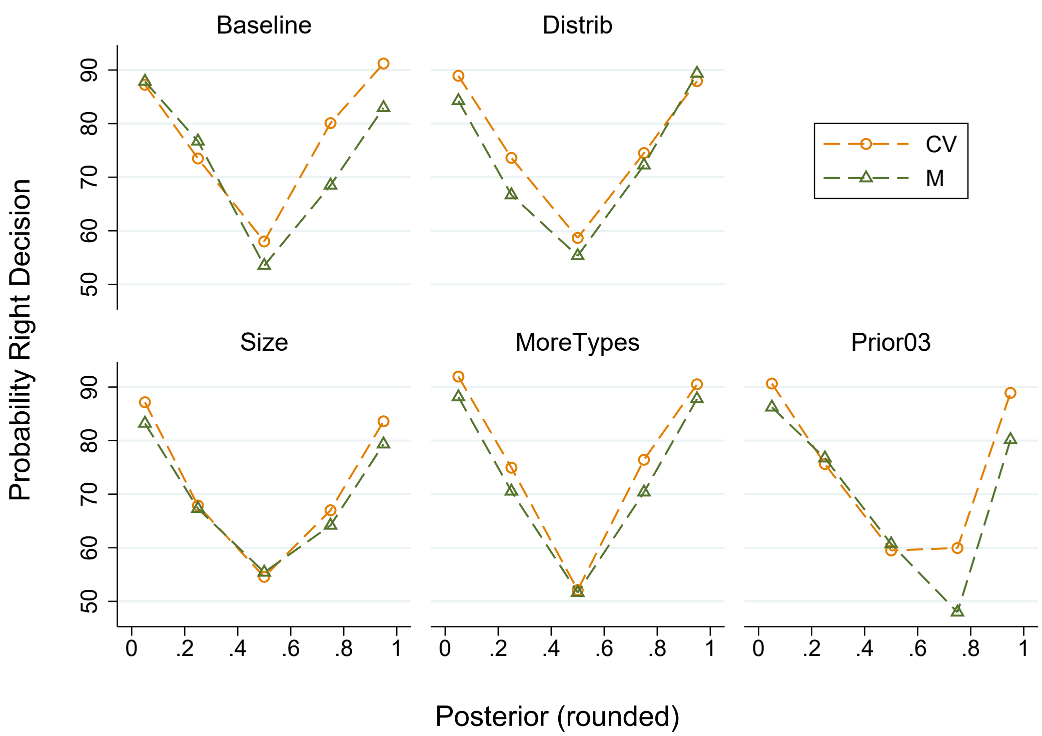

Figure E1: Probability of taking the optimal decision by posteriors. Posteriors (obtained with all the signals received in the group) are separated into 5 categories: $[0, 0.1]$, $(0.1, 0.4)$, $[0.4, 0.6]$, $(0.6, 0.9)$, and $[0.9, 1]$.

[38]In particular, we ran 10,000 simulations for each individual group and mechanism. For each independent group and each mechanism, we run 10,000 simulations. In each of these simulations, a state is randomly chosen, the signals are randomly assigned to each of the subjects, and then a vote is casted following the distribution of votes observed in that group.

F Experimental Instructions

Thank you for taking part in this experiment. Please read these instructions very carefully. It is important that you do not talk to other participants during the entire experiment. In case you do not understand some parts of the experiment, please read through these instructions again. If you have further questions after reading and hearing the instructions, please raise your hand out of your cubicle: we will then approach you in order to answer your questions personally. Please do not ask anything aloud. The rules are the same for all participants.

During the experiment all sums of money are listed in ECU (for Experimental Currency Unit). How much you earn depends partly on your own decisions, partly on the decisions of other participants, and partly on chance. Your earnings during the experiment will be converted to euros at the end and paid to you in cash. The exchange rate is 40 ECU = 1€. The earnings will be added to a participation payment of 5€. Your personal earnings will be paid to you in cash as soon as the experiment is over.

After the experiment, we will ask you to complete a short questionnaire, which we need for the statistical analysis of the experimental data. The data of the questionnaire, as well as all your decisions during the experiments will be anonymous.

The experiment you are participating in is a group decision-making experiment. At the beginning of this experiment, participants will be randomly and anonymously divided into groups of 5 participants. These groups remain unaltered for the entire experiment, but you will never be told with whom you were interacting in your group.

The experiment consists of three parts. Your earnings and decisions in each part do not depend on earnings and decisions in other parts. The instructions for each part of the experiment will be given at the beginning of that part. Now, we proceed to Part 1 of the experiment.

INSTRUCTIONS PART 1 / 2

These are the instructions for part 1/2. This part is composed of 20 rounds. The instructions are going to be the same for all rounds. [Only for part 2: The instructions for this part will be the same as the instructions of part 1, except for the voting system.]

The Triangle Color

At the beginning of each round, the computer will choose the color of a triangle randomly. Each time, the triangle will be blue ▲ with **50%** probability, and with **50%** probability it will be red ▲. You will not know the color of the triangle, but each member of your group will receive a hint. Your objective **as a group** will be to guess the color of the triangle.

Hint

As a hint of the color of the triangle, each member of your group will observe the color of one ball, drawn from an urn filled with 100 red and blue balls. The composition of blue and red balls will depend on the **color of the triangle** and on **your precision** (which is either 55, 60, or 95). In particular, if your precision is X, the urn from which you will draw a ball will contain a X number of balls of the color of the triangle, and 100 − X balls of the opposite color. That is,

- If your precision is 55 and...
  - the triangle is blue ▲, then the urn will contain 55 blue balls and 45 red balls.
  - the triangle is red ▲, then the urn will contain 45 blue balls and 55 red balls.
- If your precision is 60 and...
  - the triangle is blue ▲, then the urn will contain 60 blue balls and 40 red balls.
  - the triangle is red ▲, then the urn will contain 40 blue balls and 60 red balls.
- If your precision is 95 and...
  - the triangle is blue ▲, then the urn will contain 95 blue balls and 5 red balls.
  - the triangle is red ▲, then the urn will contain 5 blue balls and 95 red balls.

You will observe the color of one ball, drawn randomly from this urn. A higher precision means that it is more likely that the ball you receive has the same color as the triangle.

At the beginning of each round, you and each of your fellow group members will be assigned a given level of **precision**. In particular, each member will be assigned
- a precision of **55** with a probability of **15%**
- a precision of **60** with a probability of **70%**
- a precision of **95** with a probability of **15%**

Precisions will be assigned independently for each member of the group, so you and the other members of your group might have different precisions. You will learn your own precision, but will not know the precision of the other members of the group.

Together, the color of the triangle and your level of precision determine the number of blue and red balls in your urn. The computer will then draw one of these balls at random, and show it only to you. The computer follows the same procedure for each of the other four members of your group. Each member has his or her own precision, and might observe the same or another ball than the one you observe. But, in each round, the color of the triangle is the same for all members of the group.

Your Voting Decision

[M treatments:] Your voting decision is one of three options: (1) vote Blue, (2) vote Red, or (3) Abstain from voting. Each actual vote counts as one point for that color.

[CV treatments:] Your voting decision is one to (1) vote Blue, or (2) vote Red, and indicate the number of points you allocate to the color you vote for. You can allocate any number between 0 and 20 to the color you vote for, including decimals. You can insert decimals using a point. You can abstain by allocating zero points.

The other members of your group will cast votes in the same fashion.

Voting Rule and Group Decision

The **group decision** will be determined by majority / cumulative voting. In particular, the group decision will be the color which receives the highest number of votes/points. That is,

- If the number of votes/points for blue is **higher** than the number of votes for red, the group decision is blue.
- If the number of votes/points for red is **higher** than the number of votes/points for blue, the group decision is red.

Finally, if the number of votes/points for blue and red is the same, one of them is going to be selected randomly. With 50% probability the group decision will blue, and with 50% probability the group decision will be red.

Your Payoff

If your **group decision** is

- **equal** to the **color of the triangle**, each member of your group earns 100 ECUS.
- **not equal** to the **color of the triangle**, each member of your group earns 0 ECUS.

Information at the end of each Round

Once you and all the other participants have made your choices, the round will be over. At the end of each round, you will receive the following information about the round: the color of the triangle, the total numbers of votes/points for Blue and the total numbers of votes/points for Red [[M:] and abstentions in your group].

[Only in Communication treatments:] Communication before Voting

After receiving your hint, and before voting, you will be able to communicate with the members of your group through a chat window during 30 seconds. In this chat, it is important that (i) you do not identify yourself or (ii) you do not use improper language towards other members of the group. Besides that, you can communicate anything you wish. You can write messages by typing a message in the blue bar in the inferior part of the screen and send it by hitting enter. All messages will be seen by all members of the group and each member will have an anonymous identifier (Player 1, Player 2, . . .). If you want to leave the chat earlier, please press the button "I'm done" in the bottom right corner. If all participants push this button before the 30 seconds deadline, the communication stage will finish.

Final Earnings in this Part

After the 20 rounds are over, the computer will randomly select 2 of the 20 rounds and you will receive the rewards that you had earned in each of those rounds. Each of the 20 rounds has the same chance of being selected.

Control Questions

Before starting, you will have to fill in some control questions in the computer terminal. Click the button OK after you have answered a question to move to the next question. In case you answer wrongly, an error message will pop out and you will have to answer it again. Once you and all the other participants have filled all the questions the experiment will start.