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Evidence on the neglected role of primary elections

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More ambiguity, more sincere voting? Evidence on the neglected role of primary elections*

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Abstract

Primary elections are increasingly used by political parties to consolidate preferences within their electorate and to select the candidate they will present in the subsequent general election, whose outcome nevertheless remains uncertain. Despite the central role of primaries in democratic processes, the literature has largely overlooked the ambiguity they generate. This paper fills this gap with a theory-driven laboratory experiment that studies how two types of ambiguity – *preference ambiguity* (uncertainty about the distribution of voters' preferences under primaries) and *outcome ambiguity* (uncertainty about whether the winner of the primaries will win the general election) – affect voter behavior in primary elections, based on a cross-country experiment in Italy and Japan. Building on the model proposed by Bouton et al. (2017), which we reinterpret as the first stage of a primary election with preference ambiguity, we extend the framework by adding a second stage that mimics a general election. This additional stage introduces ambiguity regarding the outcome of the general election and provides a more realistic representation of real-world electoral dynamics. We show that the interplay between preference and outcome ambiguity fosters convergence toward a sincere voting equilibrium: voters place greater weight on ideological alignment than on strategic considerations, and cultural and institutional differences have only a marginal effect.

Keywords: Primary election; sincere voting; Duverger's law; preference ambiguity; outcome ambiguity

JEL classification: C92; D72; D81; P16

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1. Introduction

Elections are the cornerstone of democratic societies, allowing citizens to express preferences and influence governance. However, the electoral process inherently involves ambiguity, as voters must make decisions under uncertain conditions, such as preference distribution, candidate viability, and policy outcomes. In this context, primary elections are pivotal in providing a preliminary stage for voters to express their preferences.

Primary elections (commonly known as primaries) are a preliminary electoral process through which political parties internally select their candidates for an upcoming general election (Sandri et al., 2015). This mechanism allows party members or, in some cases, all eligible voters, to participate in choosing the individual who will represent their party on the ballot.[1] Primaries are designed to democratize candidate selection, giving voters a direct role in determining political contenders.

Given this unique dynamic, primary elections gained significance in the United States, initially at the county-state level during the 1890s, and then at the local level during the 1900s. Since then, they have become a regular feature, with at least one political party in all 50 country-states conducting primaries before each forthcoming general election. Moreover, since 2000, primary elections have also been adopted by political parties in an additional 24 countries worldwide, including 6 in the Americas, 10 in Europe, 3 in Asia, 4 in Africa, and 1 in Oceania, before at least one general election.[2]

Although primaries democratize candidate selection, they also introduce additional ambiguity and strategic complexity into the electoral process, since they are frequently scheduled by political parties based on their own calendars, according to each party's priorities or internal rules. For voters participating in these primaries, this means multiple electoral sequences may overlap, with their schedules not necessarily synchronized. This lack of alignment creates a source of *outcome ambiguity*, as voters in party A cannot anticipate with certainty whether the candidate emerging from their primary will ultimately prevail in the subsequent general election.

Compounding this is the inherent *ambiguity in preference distribution* under primaries. Unlike a general election, where ideological divides between parties are more clearly delineated, primaries involve competition among candidates within the same political alignment, with the same core values. This blurs the boundaries of voter preferences, making it harder to predict the viability of individual candidates.

Given these two types of ambiguity, voters define their voting strategy by balancing the psychological and mechanical effects of the electoral process (Duverger, 1951; Blais and Carty, 1991; Van der Straeten et al., 2010). The psychological effect influences voter behavior by prompting them to account for the consequences of their votes, while the mechanical effect consists of the transformation of votes into seats through the application of electoral rules. The interplay between the two effects shapes voter strategies by creating a trade-off between two types of equilibria: *Sincere voting* or *Duverger's Law*. Sincere voting

[1]Primaries can be classified into four types based on voter eligibility and participation rules: (i) *closed primaries*, where only registered party members can vote, ensuring candidate selection is determined solely by party affiliates; (ii) *open primaries*, where any eligible voter, regardless of party affiliation, can participate, broadening the voter base; (iii) *semi-closed primaries*, where both registered party members and independent or unaffiliated voters can participate; and (iv) *top-two or jungle primaries*, where all candidates, regardless of party affiliation, compete in a single primary, and the top two contenders advance to the general election. For a detailed analysis of the different types of primaries, voter eligibility, and their influence on electoral outcomes, see Rosenstone (1993).

[2]In the Americas: Argentina (2011, 2023), Canada (2013, 2017), Chile (2013, 2017), Colombia (2006, 2010), Costa Rica (2001, 2009, 2013, 2017, 2021), and Uruguay (2004, 2009, 2014, 2019). In Europe: Armenia (2007, 2017), France (2011, 2016, 2021), Germany (2013), Hungary (2019), Italy (2005, 2007, 2009, 2013, 2017, 2019, 2023), Poland (2019, 2020), Portugal (2014), Russia (2007, 2011, 2016, 2017), Spain (2014), and United Kingdom (2010, 2015). In Asia: Hong Kong (2020), Republic of Korea (2019), and South Korea (2017). In Africa: South Africa (2014, 2019, 2024), Kenya (2017), Nigeria (2015, 2019, 2023), and Ghana (2016). Australia is the only nation in Oceania where primary elections have been held so far (2013, 2016).

equilibrium occurs when voters cast their ballots for their most preferred candidate, prioritizing ideological alignment over strategic considerations, regardless of the candidate's likelihood of winning. In contrast, Duverger's Law equilibrium reflects strategic behavior in competitive systems, where voters aim to maximize their expected utility by supporting a viable contender with a strong chance of winning, even if this contender is not their first preference. This approach minimizes the risk of wasting votes (Duverger, 1951; Cox and Shugart, 1996; Cox, 1997; Lago, 2008).

The main purpose of this paper is to theoretically formalize and experimentally examine how the outcome and preference ambiguity, typical of primary elections, shape voter behavior, influencing their tendency to converge toward either a Sincere voting equilibrium or a Duverger's Law equilibrium. We specifically focus on primaries because, although they have barely been considered in the literature, the ambiguity inherent in these elections and the consequences they generate for general elections can be substantial.

To proceed in this investigation, we adopt the theoretical and experimental framework of Bouton et al. (2017) as our benchmark model. They studied whether the presence or the absence of ambiguity regarding the distribution of preferences in the electorate can induce significant changes in voting behavior, potentially leading to a Sincere voting equilibrium in multi-candidate elections under a plurality system. Their findings suggest that in the absence of preference ambiguity, subjects are able to correctly anticipate the expected ranking and coordinate their votes around the strongest contender, thereby voting strategically. However, they observe a significant shift towards a massive sincere voting strategy in scenarios with preference ambiguity, thereby converging to the namesake equilibrium.

Given these premises, our intervention in the benchmark model is twofold. First, we reinterpret the one-stage framework proposed by Bouton et al. (2017) as a primary election. In our context, this refers specifically to a closed primary election, which we term the *intra-positional election* (as it occurs within a single political position). This reinterpretation closely mirrors *preference ambiguity* in real-world primary elections for the straightforward re-election of a party's internal representative at the end of their term, such as those conducted by the Democratic Party in Italy, and it is not directly related to participation in subsequent national or supranational elections.

Second, we extend the model to include a second stage, representing the general election. Here, candidates selected during the primary election compete against each other for the same office. We term this the *inter-positional election*. This reflects the sequential nature of U.S. primaries, in which candidates from major parties, such as Republicans and Democrats, first compete to secure their party's nomination before facing each other in the subsequent presidential (i.e., general) election. Within this two-stage framework, voters may first experience *preference ambiguity* and later *outcome ambiguity*.

Under this extended scenario, we implement a theory-driven experiment to examine whether a Sincere voting equilibrium persists when preference ambiguity is compounded by outcome ambiguity in a sequential (two-stage) voting game, thereby extending and generalizing the findings of Bouton et al. (2017).

From a theoretical perspective, we propose a two-stage sequential voting game by defining an economic system characterized by three distinct political positions, each represented by three candidates. Within each political position,[3] a fixed number of voters are divided into types based on two dimensions of preference: intra-positional preferences (for specific candidates within their political position) and inter-positional preferences (for candidates from other political positions). Then, each voter type forms beliefs about preference

[3]Although they correspond to distinct political parties, each political position has the same internal voting mechanism as in Bouton et al. (2017). While Bouton et al. (2017) focuses on a single-stage voting game with only preference ambiguity (requiring only one political position), our model incorporates a two-stage election. This two-stage election requires multiple political parties to account for the diversity of voters' opinions.

distribution and electoral outcome, incorporating these beliefs into their voting strategy.

Beliefs' formation depends on the informativeness of a public signal about the distribution of preferences within their own political position, determining if the election is characterized by preference ambiguity or not. However, no public signal is provided on the distribution of preferences in other political positions. As a result, voters face outcome ambiguity. Based on the formed belief, they define a voting strategy that maximizes their expected utility, converging toward a sincere voting strategy as the information available decreases, and hence as ambiguity increases.

The experimental design aims to represent this setting in the lab. Specifically, we investigate voters' behavior at increasing levels of ambiguity, according to four configurations. The first two constitute our control treatments, as they replicate the experimental design proposed by Bouton et al. (2017). Subjects are involved in an intra-positional election featuring three exogenous candidates: two majoritarian (namely, Blue and Red) and one minoritarian (Gray). Each participant is assigned a ball corresponding to the color of one of the two majoritarian parties, representing their political preference. Additionally, they are aware of two possible states of nature (referred to as Blue or Red jar), with the strongest contender corresponding to the verified state of nature. Indeed, the Blue (resp., Red) jar contains more Blue (resp., Red) balls, and the distribution of these balls is determined through random draws from the selected jar. Subjects are then tasked with casting a ballot for one of the three candidates under two different treatments: a *No Preference Ambiguity* (henceforth, NPA) treatment and a *Preference Ambiguity* (henceforth, PA) treatment.[4]

Under NPA, voters know from which of the two jars their balls were randomly drawn. Hence, they have complete information about voters' preferences for their political position. Conversely, under PA, voters do not know from which jar their votes were randomly drawn. Hence, they have incomplete information about the distribution of voters' preferences within their political position.[5]

The other two configurations, which constitute the main treatments of our experimental setting, introduce a second stage of inter-positional elections, thereby inducing outcome ambiguity. In the first stage, voters cast a ballot for one of the three candidates (Blue, Red, or Gray) within their political position, under either the NPA or PA scenario. Then, the winner of the first-stage election is announced and advances to the second stage, where they compete against two candidates from other political positions (Green and Black). The final electoral outcome is determined by a random draw, with each candidate having an equal probability of winning. Therefore, voters are active only in the first-stage election, as in the two control treatments.

With this design, we reproduce the general electoral scenario by adding two new treatments to the original protocol. The *No Preference Ambiguity but Outcome Ambiguity* (hereafter, NPA+OA) treatment replicates the NPA treatment as a sequential primary–general election system where, in the absence of ambiguity about preference distribution, the second draw introduces ambiguity about the electoral outcome (OA). The *Preference and Outcome Ambiguity* (hereafter, PA+OA) treatment replicates the PA treatment as a sequential primary–general election system in which ambiguity about preference distribution during the primary elections is complemented by ambiguity about the outcome in the general election. Within this framework, we interpret the two control treatments of Bouton et al. (2017) – NPA and PA – as voting environments without outcome ambiguity.[6]

Throughout our theoretical formalization and experimental investigation, we posit that outcome ambigu-

[4]In the notation of Bouton et al. (2017), the two treatments are indicated respectively as no aggregate uncertainty (hereafter, NAU) and aggregate uncertainty (hereafter, AU) about the preferences distribution in the electorate.

[5]For the sake of simplicity, we refer with "no preference ambiguity vs. preference ambiguity" to the dichotomy of voters' certainty vs. uncertainty on the prior distribution of preferences about the blue and red candidates.

[6]We avoid using the notation NPA+NOA and PA+NOA to prevent overburdening the reading of the article.

ity amplifies the contrasting behaviors observed in NPA vs. PA treatments. Under the NPA+OA treatment, where only outcome ambiguity is present, voters' motivation to support the most representative candidate is expected to increase relative to the NPA treatment. Since outcome ambiguity is not directly affected by voting choices and each candidate is aware of the strongest contender, strategic voting becomes more prevalent, leading to an outcome consistent with Duverger's Law. When each candidate is not certain to win the second-stage general election (OA) – resulting in a lower expected payoff – voters exhibit stronger coordination on strategic voting in the NPA+OA treatment than in the NPA treatment (where such coordination already occurs), as a means to avoid further payoff reductions. In contrast, under the PA+OA treatment, ambiguity about the distribution of preferences steers voters toward supporting their preferred candidate, as in the PA treatment. In addition, the simultaneous presence of both preference and outcome ambiguity further constrains voters' decision-making. Accounting for ambiguity about the electoral outcome strengthens convergence toward the sincere voting strategy (the first-best candidate) even more than under the PA treatment.

An additional contribution is in the investigation of cross-country differences in voters' strategies under preference and/or outcome ambiguity during primary-general election. To achieve this, we collect data from two countries – Italy and Japan – under the same experimental conditions. The selection of these two democracies was not arbitrary, but influenced by the electoral dynamics that define them. Italy has traditionally embraced a system of primaries and, apart from the US, is the country where they have been held most often for national elections.[7] In contrast, political parties in Japan have never conducted primary elections. Despite this, the two countries are comparable in terms of liberalism and democratic standards.[8]

We leverage this contrast to check whether participants exhibit similar voting strategies when faced with the same ambiguous situations, regardless of country-related cultural and political differences.

The remainder of the paper is organized as follows. Section 2 discusses the relationship between our work and the existing literature. Section 3 reports on the theoretical formalization. Section 4 describes the experimental design and formulates the behavioral hypotheses. Section 5 presents the main results. Section 6 concludes.

2. Related literature

Our paper relates to the vast literature that seeks to understand if and to what extent significant differences in voting strategies exist, considering different states of the world (from more unambiguous to more ambiguous scenarios) and whether such differences are related to cultural dissimilarities in policy perception.

Voting strategies in multi-candidate elections have been widely studied across different electoral systems (e.g., Downs (1957); McKelvey (1972); Cox and Shugart (1996); Cox (1997); Alvarez and Nagler (2000)). Much of this research builds on the psychological effect described by Duverger's Law (Duverger, 1951),[9],

[7]Since its establishment in 2007, the Democratic Party has consistently organized primary elections.

[8]The *Democracy index* (available at Democracy Index) shows that, in the past ten years, from 2015 to 2024, both Italy and Japan consistently ranked in the top one-third of global democracies, with average scores of 7.73 and 8.14 on a scale from 0 to 10 for democracy, respectively. Additionally, according to the *Freedom in the World Index* published by Freedom House (available at Freedom House), which assesses political rights and civil liberties worldwide, both countries are recognized among the most democratic countries. On a scale from 0 to 100, in the last nine years, from 2017 to 2025, Italy typically receives scores between 89-90, while Japan always has a score of 96, indicating high levels of liberalism and democratic standards.

[9]The psychological impact of Duverger's law can be illustrated by a simple majority single-ballot system with more than two parties. Voters realize that consistently supporting a third party renders their votes ineffective, leading them to consolidate support behind a leading candidate (see (Palfrey, 1988; Taagepera and Shugart, 1989; Blais and Carty, 1991; Dolez and Laurent, 2010; Xefteris, 2019)). Subsequent studies show that Duvergerian equilibria can emerge even when three candidates each receive a

which predicts that under unambiguous conditions, voters coordinate around the strongest contender, though with varying welfare effects (Bouton, 2013; Bouton et al., 2022). Moreover, comparisons of one-round and two-round elections (Blais et al., 2007; Blais et al., 2011; Hausladen et al., 2024) show a consistent shift toward Duvergerian equilibria, with voters abandoning less viable candidates strategically. This tendency is strongest in one-round elections, where preference distributions are simpler and ambiguity is lower.

Our study extends this strand by examining how differences in strategic voting depend not only on the electoral system but also on the types and levels of ambiguity voters face, focusing on primary elections. Early experimental work by Cherry and Kroll (2003) shows that voter behavior in primaries varies across formats (closed, semi-closed, open, and top-two), often resulting in unconventional outcomes. Using survey data from U.S. presidential primaries (1984–2004), Culbert (2015) demonstrates that voters adopt more strategic approaches, favoring candidates with stronger prospects in the general election. Similarly, Di Tella et al. (2025) show that candidates in two-round elections in the U.S. and France behave more strategically when moving from primary to general election. These findings align with the traditional view that, under complete information, voters maximize expected utility by coordinating around the strongest candidate, consistent with Duverger's Law (Forsythe et al., 1993; Myerson and Weber, 1993; Fey, 1997; Abramson et al., 1992, 2004; Bouton and Castanheira, 2012; Xefteris, 2019). However, when ambiguity is introduced, the rational-voter model becomes less predictive (Dewan and Myatt, 2007; Myatt, 2007; Mandler, 2012; Bouton, 2013; Myatt, 2017), and Duvergerian equilibria can break down in favor of sincere voting. Studies comparing behavior under ambiguous and unambiguous conditions (Fisher and Myatt, 2002; Bouton et al., 2017; Fisher and Myatt, 2017) show that incomplete information on others' preferences hampers coordination (Louis et al., 2022), whereas complete information facilitates it (Reitz et al., 1998). Theoretical models further show that strategic voting persists under conditions of risk and ambiguity (Merrill, 1982). Building on Bouton et al. (2017), our experimental setup explores the interplay of multiple dimensions of ambiguity, extending previous studies that considered only a single type of ambiguity.

The impact of ambiguity may also vary across cultural and institutional contexts. Although numerous studies compare political-electoral systems in countries such as Italy and Japan (Reed, 1994; Giannetti and Grofman, 2011; Samuels, 2019), few focus on voter behavior. Cox and Schoppa (2002) examine electoral competition in Italy and Japan, suggesting that Duvergerian equilibria may not always hold. Similarly, Reed (2001) finds that strategic behavior declines when differentiating losing candidates is difficult, leading to convergence toward sincere voting. Both studies identify similar voting patterns in these two democracies. Our study is closely related to these comparative analyses. To our knowledge, ours is the first comparative study of electoral competition in Italy and Japan using an experimental approach.

3. Theoretical model

3.1 The model

Consider an economic system S characterized by three distinct political positions $P = \{P_1, P_2, P_3\} \in S$. Each political position P_i consists of a set of three candidates, $\Psi = \{A_{P_i}, B_{P_i}, C_{P_i}\}$, for every $i = \{1, 2, 3\}$, each motivated by the same political ideology but different political priorities.[10] For each political position P_i, the

positive share of votes (Bouton and Gratton, 2015; Bouton et al., 2017)

[10]Although the candidates within each political position support the same core values and fundamental principles, they may differ in their areas of interest (e.g., prioritizing economic, social, or environmental issues), leadership styles, affiliations with more moderate or radical internal factions, positions on the political establishment, or appeal to specific demographic groups (such as

electorate is a finite and fixed set of pure policy-oriented voters $N = \{1,2,...,n\}$, who has to cast a ballot to select one of the three candidates – $A_{P_i}, B_{P_i}, C_{P_i}$ – in their political position. The selected candidate will then compete against the selected candidates from the other political positions for the same office.

The electoral rule is based on a plurality system. In the first stage, the candidate who secures the most votes for each political position advances. In the second stage, the top candidates from these positions compete and the winner, determined by receiving the most votes, assumes office.

Each i voter in the economic system S has a complete order of preferences within their political position – i.e., intra-positional preferences – and across candidates from other political positions – i.e., inter-positional preferences. Let $T = \{t_{A_{P_i}}, t_{B_{P_i}}, t_{C_{P_i}}\}$ represent the set of three mutually exclusive voter types within P_i. Then, the order of preferences for each voter type within the same political position is as follows:

$$\begin{aligned} t_{A_{P_i}} &: A_{P_i} \succ B_{P_i} \succ C_{P_i} \\ t_{B_{P_i}} &: B_{P_i} \succ A_{P_i} \succ C_{P_i} \\ t_{C_{P_i}} &: C_{P_i} \succ A_{P_i} \sim B_{P_i} \end{aligned} \tag{1}$$

Considering the intra-positional preferences, the electorate is divided into two main groups: a majority group consisting of $n_{A_iB_i}$ voters who view C_{P_i} as the least desirable option, and a minority group of n_{C_i} voters who prefer C_{P_i} to all other candidates. Within the majority group, there is a further disagreement: type $t_{A_{P_i}}$ voters prefer A_{P_i} over B_{P_i}, while type $t_{B_{P_i}}$ voters prefer B_{P_i} over A_{P_i}.

Additionally, voters within the same political position P_i may also differ in their inter-positional preferences. For example, consider the order of preferences for the three types in P_1, we can assume that:

$$\begin{aligned} t_{A_{P_1}} &: A_{P_1} \succ B_{P_1} \succ C_{P_1} \succ A_{P_2} \succ B_{P_2} \succ C_{P_2} \succ A_{P_3} \succ B_{P_3} \succ C_{P_3} \\ t_{B_{P_1}} &: B_{P_1} \succ A_{P_1} \succ C_{P_1} \succ B_{P_3} \succ A_{P_3} \succ C_{P_3} \succ B_{P_2} \succ A_{P_2} \succ C_{P_2} \\ t_{C_{P_1}} &: C_{P_1} \succ A_{P_1} \sim B_{P_1} \succ C_{P_2} \succ A_{P_2} \sim B_{P_2} \succ C_{P_3} \succ A_{P_3} \sim B_{P_3} \end{aligned} \tag{2}$$

Type $t_{A_{P_1}}$ voters strongly prioritize their political position, ranking candidates, as shown in (1). Among candidates outside P_1, they prefer those in P_2 over those in P_3, following a specific ranking order within each political position. In contrast, type $t_{B_{P_1}}$ voters also prioritize P_1, but their second preference lies in P_3 rather than P_2, again maintaining a distinct ranking order for candidates outside of their position.

Similar patterns of inter-positional preferences can also be observed for the three voter types in P_2 and P_3, where voters prioritize their political position while differing in their rankings of candidates from other positions.

youth, older voters, or cultural minorities).

3.2 Two-elections timeline

The electoral process consists of two sequential stages: the *intra-positional election* and the *inter-positional election*. In the first stage of intra-positional election, each voter group selects a candidate from within their political position, aiming to identify a strong representative to advance. In the second stage of inter-positional election, the candidates chosen for each political position compete against one another for the same office. According to the plurality system, the candidate with the most votes wins in both stages.

The timeline of this two-stage sequential voting game can be summarized in Table 1. From *Time 0* to *Time 3*, the model follows that of Bouton et al. (2017) whereas *Time 4* is the main innovation of our model.

TABLE 1. Time sequence of the game

Stage 1: Intra-positional election	
Time 0	State of nature is randomly assigned.
Time 1	Voter types are randomly assigned.
Time 2	Public signal about the state of nature is revealed.
Time 3	1^{st} Election day: voters select candidates to represent their political position.
Stage 2: Inter-positional election	
Time 4	2^{nd} Election day: the winner is selected from the candidates representing each political position.

Before starting, given the intra-positional election and according to the related order of preferences, we assume (following Bouton et al., 2017) that for the minority group of voters ($t_{C_{P_i}}$) voting for C_{P_i} is their dominant strategy. For the majority group of voters, i.e., those of types $t_{A_{P_i}}$ and $t_{B_{P_i}}$, their votes are split between A_{P_i} and B_{P_i} based on their strict preferences. As a result, to defeat C_{P_i}, either A_{P_i} and B_{P_i} must secure at least n_{C_i} votes. Therefore, we consider the case in which C_{P_i} represents a large minority, such that $n_{A_iB_i} - 1 > n_{C_i} > \frac{n_{A_iB_i}}{2}$. This implies that C_{P_i} is a Condorcet loser, preferred by fewer voters in head-to-head competition, but can still win if the majority voters split their votes between A_{P_i} and B_{P_i}.

Let $\omega_i \in \Omega = \{a_i, b_i\}$ be the set of the two possible states of nature inside each political position, i.e., $\omega_i = a_i$ when the majority originates from A_{P_i} and $\omega_i = b_i$ when the majority comes from B_{P_i}.

At **Time 0**, one of the two states of nature, either a_i or b_i, is randomly selected with probability $q(a_i)$ and $q(b_i) = 1 - q(a_i)$, respectively. Formally, $q : \Omega \Rightarrow [0,1], q(a_i) + q(b_i) = 1$. There is a random draw for every political position.

At **Time 1**, each voter under a political position P_i is assigned to a type $t_i \in T = \{t_{A_{P_i}}, t_{B_{P_i}}\}$ through an independent and identically distributed random draw, from a binomial distribution with conditional probabilities dependent on the state of nature.

Let $r(t_i|\omega_i)$ be the conditional probability of being assigned to a type t_i given the state $\omega_i \in \Omega$, it should satisfy the two following conditions:

(i) $0 < r(t_i|\omega_i) < 1$, for all $t_i \in T$ and $\omega_i \in \Omega$;

(ii) $r(t_{A_{P_i}}|\omega_i) + r(t_{B_{P_i}}|\omega_i) = 1$, for all $\omega_i \in \Omega$.

The conditional probability $r(t_i|\omega_i)$ is common knowledge and varies depending on the state of nature. For instance, in state a_i, type $t_{A_{P_i}}$ is more likely than in state b_i since $r(t_{A_{P_i}}|a_i) > r(t_{B_{P_i}}|b_i)$.

Given the conditional probability, the distribution of voter types could be *unbiased* if $r(t_{A_{P_i}}|a_i) = r(t_{B_{P_i}}|b_i)$, i.e., the probability of the majority type is equal in the two states of nature, or *biased* if $r(t_{A_{P_i}}|a_i) \neq r(t_{B_{P_i}}|b_i)$, i.e., the probability of the majority type differs across states.

By convention, to ensure a clear probabilistic framework, we focus on the case where type $t_{A_{P_i}}$ is that with the highest density across the two states of nature, i.e., $r(t_{A_{P_i}}|\omega_i) + r(t_{B_{P_i}}|\omega_i) \geq 1$.

At **Time 2**, a public signal on the state of nature, $s_i \in S = \{s_0, s_a, s_b\}$, is observed by members of the same political position. Importantly, no public signal is provided regarding the state of nature of the other political positions.

We consider two polar scenarios with respect to the informativeness of the public signal s_i:

1. *Partially informative signal:* with probability 1, the signal is s_a (resp., s_b) if the state of nature is a (resp., b). The signal fully identifies the state of nature in P_i, but voters remain uncertain about the state of nature in the other two political positions P_j and P_k.

2. *Uninformative signal:* with probability 1, the signal is s_0, regardless of the actual state of nature. In this case, the signal offers no information about the state of nature in P_i, leaving voters within and without the political position with their prior beliefs.

Given the public signal s_i, voters update their belief about the state of nature in the intra-positional scenario, and hence about the potential winner of the 2^{nd} election day.

For the two-stage election, the cumulative belief for a type t_i voter can be expressed as follows.

$$\mu(\omega_i, \omega_j, \omega_k|t_i, s_i) = \beta(\omega_i|t_i, s_i) \times \eta(\omega_j|t_i) \times \eta(\omega_k|t_i) \tag{3}$$

where:

$$\beta(\omega_i|t_i, s_i) = \begin{cases} 1 & \text{if } s_i \in \{a_i, b_i\}, \\ \frac{q(\omega_i)\cdot r(t_i|\omega_i)}{q(a_i)\cdot r(t_i|a_i)+q(b_i)\cdot r(t_i|b_i)} & \text{if } s_i = s_0. \end{cases}$$

and

$$\eta(\omega_j|t_i) = \frac{q(\omega_j) \cdot r(t_i|\omega_j)}{\sum_{\omega_j \in \Omega} q(\omega_j) \cdot r(t_i|\omega_j)},$$

$$\eta(\omega_k|t_i) = \frac{q(\omega_k) \cdot r(t_i|\omega_k)}{\sum_{\omega_k \in \Omega} q(\omega_k) \cdot r(t_i|\omega_k)}.$$

The parameter β captures the intra-positional belief about the state of nature ω_i for their political position P_i, based on their type t_i and the given signal s_i. For $s_i = s_0$, β can be identified as a proxy of the level of intra-positional ambiguity, i.e., *preference ambiguity*. Likewise, the parameter η captures the voter's belief about the state of nature outside their political position P_i, unaffected by s_i and solely relying on their prior probabilities $q(\omega_j)$ and $q(\omega_k)$, calibrated by the voter's type t_i. Therefore, this parameter can be seen as a proxy for the degree of ambiguity outside the political position, i.e., *outcome ambiguity*.

At **Time 3**, each voter t_i type casts a ballot for one of the three candidates of their political position P_i. Therefore, $\Psi = \{A_{P_i}, B_{P_i}, C_{P_i}\}$ is the action set. At the end of the intra-positional election, according to the plurality rule, the candidate with the highest number of votes wins and becomes the representative for the political position. In the event of a tie, the winner is determined by a fair dice roll.

At **Time 4**, the representatives elected from each political position compete for the same office. Each representative has an equal probability of winning the election, and the winner is declared by a fair dice roll.[11]

3.3 Voting strategy

Before defining the voting strategy, we preserve an important assumption from Bouton et al. (2017) model, i.e., voters of the same type and signal behave in the same way. This assumption simplifies the analysis by allowing us to focus solely on symmetric pure strategies.

Given the electoral system, we define the voting strategy as a function $\sigma : T \times P \times S \rightarrow \Delta(\Psi)$ which maps the voter's type, the political position, and the public signal to a probability distribution over the action set Ψ. The strategy $\sigma_{t_i,P_i,s_i}(\Psi)$ specifies the probability that a type t_i voter, coming from the political position P_i, under a public signal s_i, plays action $\psi_i \in \Psi$. Then, we denote with Λ the set of all possible strategies. For each type t_i voter, the best response in the election is related to her type, her political position, the results from the public signal, and the set of available strategies, i.e., $\sigma_i : T \times P \times S \times \Lambda \rightarrow \Delta(\Psi)$.

Voters assume a strategy and cast a ballot for a candidate while facing preference distribution and/or electoral outcome ambiguity. The ambiguity about preference distribution is influenced by the informativeness of the public signal s_i. In fact, within their political position, voters know their type but not the types of others. However, they know the probability distribution of other types, and they have access to a public signal (informative or uninformative) about the state of nature. The ambiguity about the electoral outcome arises from factors outside their political position since voters lack any information about the probability distribution of the types and the state of nature in the other political positions, nor have information about the inter-positional preferences of the others within their own political position. Under these ambiguities, each type t_i voter has to form a belief that guides their choice.

Specifically, we focus exclusively on the admissible voting strategies for the 1^{st} election day under the inter-positional stage. This stage is the only one where we assume that voters engage in a voting strategy. In contrast, no strategy is admitted in the second stage of the inter-positional election. Here, the only rational strategy for voters is to cast their ballot for the candidate already selected from their preferred political position.

Given a strategy σ_i, the expected vote share for an action ψ_i in state ω_i and a political position P_i can be written as

$$\tau_{\psi_i}^{\omega_i} = \sum_{t_i \in T} \sum_{P_i \in P} \sum_{s_i \in S} \sigma_{t_i,P_i,s_i}(\psi_i) \cdot r(t_i|\omega_i)$$

Hence, the expected value of ballots cast by active voters for an action ψ_i in state ω_i is $E(x(\psi_i)|\omega_i, \sigma_i) = \tau_{\psi_i}^{\omega_i} \cdot n$.

[11] If we exclude Time 4, and hence the inter-positional election, the problem is reduced to Bouton et al. (2017) original model, where no outcome ambiguity occurs.

Each type t_i voter will play a strategy and cast a ballot according to the choice that maximizes their expected utility:

$$EU_{t_i}(\psi_i|\sigma_i,\mu_i) = \sum_{\omega_i\in\Omega_i}\sum_{\omega_j\in\Omega_j}\sum_{\omega_k\in\Omega_k} u(\psi_i,\omega_i,\omega_j,\omega_k)\cdot\beta(\omega_i|t_i,s_i)\cdot\eta(\omega_j|t_i)\cdot\eta(\omega_k|t_i)\cdot\tau_{\psi_i}^{\omega_i} \tag{4}$$

Hence, under symmetric pure strategies, the best response $\sigma_i(t_i,P_i,s_i,\lambda_i)$ for a type t_i voter is the action $\psi_i\in\Psi_i$ that maximizes their expected utility:

$$\psi_{t_i}^* = \arg\max_{\psi_i\in\Psi} EU_{t_i}(\psi_i|\sigma_i,\mu_i) \tag{5}$$

Given these assumptions, and following Bouton et al. (2017),[12] we can derive the stable equilibrium condition.

Definition 1 *A strategy profile σ_i^* is an expectationally stable equilibrium if for any voter type $t_i\in T$, political position $P_i\in P$, public signal $s_i\in S$, and for any arbitrarily small perturbation $\varepsilon>0$, the following two conditions hold:*

1. *If $\sigma^*_{t_i,P_i,\mu_i}(\psi_i)>0$, then*
$$EU_{t_i}(\psi_i|\sigma_i,\mu_i)\geq EU_{t_i}(\psi_i'|\sigma_i^*,\mu_i)\quad\forall\psi_i'\in\Psi.$$

2. *For any $\sigma'_{t_i,P_i,s_i}(\psi_i)\in[\sigma^*_{t_i,P_i,\mu_i}(\psi_i)-\varepsilon,\sigma^*_{t_i,P_i,\mu_i}(\psi_i)+\varepsilon]\cap[0,1]$, with the condition that $\sigma'_{t_i,P_i,s_i}(\psi_i)+\sigma'_{t_i,P_i,s_i}(\psi_i')=1$, it must hold that:*
$$EU_{t_i}(\psi_i|\sigma_i',\mu_i)<EU_{t_i}(\psi_i|\sigma_i^*,\mu_i)\quad and\quad EU_{t_i}(\psi_i'|\sigma_i',\mu_i)>EU_{t_i}(\psi_i'|\sigma_i^*,\mu_i).$$

The two conditions of Definition 1 ensure that the profile of strategy σ_i^* is both the best response for the voter i and the most robust to small deviations in their strategy. Specifically, the first condition guarantees that voters will only select the action ψ_i that maximizes their expected utility, given their strategy and beliefs. Then, the second condition enforces the stability of the equilibrium. Suppose a voter i slightly changes their strategy σ_i', within a small neighborhood $\varepsilon>0$ around the equilibrium strategy σ_i^*. Specifically, the voter assigns probabilities to ψ_i and ψ_i' that are close to $\sigma^*_{t_i,P_i,s_i}(\psi_i)$ and ensures that the probabilities sum to 1. If such a deviation occurs, the expected utility of the originally chosen action ψ_i decreases compared to the equilibrium utility, while the expected utility of the alternative action ψ_i' increases compared to the equilibrium utility. By iteratively applying this deviation process, the sequence of strategies $\{\sigma^m\}_{m=1}^{+\infty}$, where σ^{m+1} represents the best response to σ^m, must converge to the equilibrium strategy σ^*. This dynamic mirrors the concept of stability in Cournot competition, where deviations lead back to the equilibrium.

Given Definition 1, when can state Lemma 1.

Lemma 1 *If an equilibrium σ_i^* is strict, i.e., all voters have a strict best response, then it is necessarily stable. The converse is not true.*

[12] Bouton et al. (2017) derives their equilibrium concept from Fey (1997), where authors analyzed the stability of equilibria using the concept developed by Palfrey and Rosenthal (1990).

3.4 Equilibrium conditions

Given the expectationally stable equilibrium, we proceed by evaluating at which type of equilibrium voters under ambiguous scenarios will naturally converge.

Bouton et al. (2017) suggest that two types of equilibria will co-exist: *Duverger's law equilibria* and *Sincere voting equilibrium*.

From the traditional analysis of Palfrey (1988) and the intuition of Bouton et al. (2017), we define the Duverger's law equilibria as follow:

Definition 2 *Duverger's law equilibria occur when only two candidates obtain a strictly positive share of votes. These equilibria always exist and are expectationally stable, regardless of the information about the state of nature.*

Duverger's law equilibria arise from the pivotality of different voter types. Consider the three candidates, the two majorities A_i and B_i and the minority C_i in the political position P_i of our economic system S. Suppose that the majority A_i and the minority C_i have an equal share of votes, higher than B_i. Then, the probability of being pivotal for the voters of candidate B tends to be zero. To avoid wasting their vote, type t_{B_i} voter will cast a ballot for their second-best, i.e., the other majority party A_i. This dynamic occurs regardless of the level of information voters have about the state of nature since the latter becomes irrelevant to determine the party's ranking when its vote share is proxy to zero. Under the Uninformative signal, the only feasible Duverger's law equilibria involve voters casting their ballots for their preferred candidate, i.e., $\sigma_{t_i,P_i,s_i}(\psi_i) = 1$ for every $t_i \in \{t_{A_i}, t_{B_i}\}$ and $\psi_i \in \{A_i, B_i\}$. Under the Partially informative signal, additional equilibria emerge. Due to the lack of full information since only the state of nature inside their political position is revealed, while there is no information on the state of nature and the probability distribution in the other political positions nor on the preferences of others, voters can coordinate in different ways: (i) voters may still coordinate around their first-best candidate, i.e., voting for A_i (resp., B_i) when their type is t_{A_i} (resp., t_{B_i}) but the state of nature is b_i (resp., a_i); (ii) or they may coordinate around the candidate perceived as favorable within their political alignment, i.e., voting for A_i (resp., B_i) when the state of nature is a_i (resp., b_i). Hence, we derive Proposition 1.

Proposition 1 *Duverger's law equilibria exist and are expectationally stable under both Partially informative signal and Uninformative signal.*

Proof. See Section A.2 in Appendix A

Conditional to the information provided to the voters, another equilibrium type occurs: Sincere voting equilibrium.

Definition 3 *Sincere voting equilibrium occurs when, given a public signal s, each type t_i voter casts a ballot for their first best.*

According to Definition 3, Sincere voting equilibrium emerges when voters, given the available information about the state of nature, observe a nearly identical vote share between the two majority candidates (see Bouton et al., 2017 for an extensive explanation). Then, strategic voting is not advantageous, and the only rational behavior is to cast a ballot for the first-best alternative. Hence, we introduce Lemma 2.[13]

[13]For a mathematical proof of Lemma 2, see Bouton et al. (2017).

Lemma 2 *Under an intra-positional election with an informative signal about the state of nature, for every* $n_{A_iB_i}, n_{c_i}$ *and a public signal* $s_{\omega_i} \in \{s_{a_i}, s_{b_i}\}$*, the sincere voting equilibrium exists and is expectationally stable if and only if* $|r(t_{A_i}|\omega_i) - \frac{1}{2}| < \delta(n_{A_iB_i}, n_{c_i})$*, with* $\delta(n_{A_iB_i}, n_{c_i}) > 0$.

Given the strong assumption of Lemma 2, then we can assert that a sincere voting equilibrium continues to exist and is reinforced when an intra-positional election with informative signal about the state of nature is followed by an inter-positional election where no signal about the state of nature is provided. Therefore, we state Proposition 2.

Proposition 2 *If Sincere voting equilibrium exists and is expectationally stable under single-stage intra-positional election with* $s_{\omega_i} = \{s_{a_i}, s_{b_i}\}$*, then it also exists and remains expectationally stable when a second stage of inter-positional election is introduced. Then, under the Partially informative signal sincere voting equilibrium exists and is expectationally stable.*

Proof. See Section A.3 in Appendix A

The intuition behind Proposition 2 is straightforward. When an inter-positional election with an uninformative signal is introduced, voters already coordinating around a sincere voting strategy in the intra-positional election have no incentive to deviate from it. Without additional information, voting for their first-best choice remains the most rational behavior. As a result, the sincere voting equilibrium retains its expectational stability.

At this point, the sincere voting equilibrium will also exist and be more stable when the inter-positional election with an uninformative signal is preceded by an intra-positional election without an informative signal. Therefore, we derive Proposition 3

Proposition 3 *If Sincere voting equilibrium exists under Partially informative signal, then it also exists under Uninformative signal.*

Proof. See Section A.4 in Appendix A

The converse of Proposition 3 is not necessarily true. A Sincere voting equilibrium can exist and be stable when voters have no information (i.e., an uninformative signal), as their only rational choice is to vote according to their true preferences. However, when voters receive even partial information, sincere voting may no longer be the optimal strategy. With additional information, voters may deviate from sincere voting to maximize their expected utility based on the revealed state of nature. Thus, partial information can introduce incentives for strategic voting, which may reduce the stability of the sincere voting equilibrium.

As a result, as the available information about the state of nature diminishes, the expectational stability of the sincere voting equilibrium is strengthened. The consequent lack of information regarding the state of nature leads to an increased level of ambiguity, making sincere voting the only reasonable choice. Hence, we derive Proposition 4.

Proposition 4 *As long as the information decreases, the degree of ambiguity increases. Then, a sincere voting equilibrium exists and is the most likely to be selected.*

Proof. See Section A.5 in Appendix A

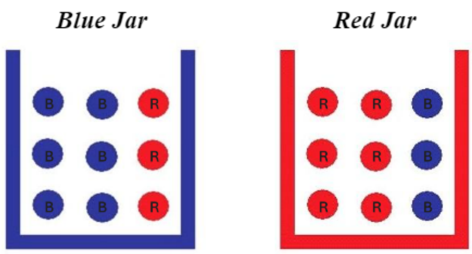
4. Experimental Design and Behavioral Hypotheses

4.1 Experimental design

The experimental design follows the same structure as the model presented in Section 3, with the two sequential stages of intra-positional (Stage 1) and inter-positional (Stage 2) election. Stage 1 replicates the environmental design in Bouton et al. (2017), and includes two scenarios, depending on whether preference ambiguity is present or not. Stage 2 is the main novelty of our design, with the introduction of a second round election, and, with it, a second type of ambiguity, i.e., the electoral outcome ambiguity. These two types of ambiguity are the two treatment variables of our design.

Stage 1. Participants are involved in a voting lottery game with three candidates: blue, red, and gray. Each participant assumes the role of an active voter and is assigned to a group of $n = 6$ active voters. Then, the computer supplements the group with $\frac{n}{2} + 1 = 4$, passive voters. With this, the total number of votes is $(3 \cdot \frac{n}{2}) + 1 = 10$.[14] Active voters are instructed about the presence of two possible states of nature: a blue jar and a red jar, the blue jar containing $\frac{2}{3}$ blue balls and $\frac{1}{3}$ red balls, the red jar containing $\frac{2}{3}$ red balls and $\frac{1}{3}$ blue balls, thus maintaining an unbiased distribution (see Figure 1).

FIGURE 1
The two jars.



The computer randomly selects one of the two jars with equal probability for each group. Then, each active voter is assigned a color – blue or red – defining their type, determined by a random draw of a ball with replacement from the selected jar. Each active voter observes their own color and never observes the colors assigned to the other active voters.

After the jar and ball assignment, each of the 6 active voters casts a ballot for one of the three candidates – blue, red, or gray – knowing that the computer would surely cast 4 votes (passive voters) for gray.

The color-winner Stage 1 election is the one that obtains the highest number of votes. This color represents the so-called *group decision*. Therefore, for either the blue or red candidate to win without a tie, at least 5 votes from the 6 active voters are needed. A blue-red tie is not possible by construction. In the event of a blue-gray or red-gray tie, one of the two candidates with 4 votes is selected randomly.

Stage 2. The computer adds the ball representing the winner of Stage 1 (i.e., the color representing the group decision) to an urn together with two other ball colors: a green ball and a black ball. The computer then randomly selects one of these three balls (each of which has $\frac{1}{3}$ probability of being selected) to represent the winner of the Stage 2 election.

[14] The reduction in group size compared to Bouton et al. (2017) (i.e., 6 rather than 12 active voters) was necessary to adapt the experiment to the dimension of the laboratory in Japan in order to guarantee subjects' anonymity within a group. This also explains why the number of passive voters in our study is $3+1=4$ while in Bouton et al. (2017) is $6+1=7$, thereby maintaining the same rule of half of the size of the number of active voters plus one.

Treatments and payoffs. The final payoff of each voter is based on their type (i.e., the color of the assigned ball) and the final election winner (i.e., the winner of Stage 1 or Stage 2 election), based on the selected treatment.

We distinguish four different treatments:

NPA treatment. Voters participate in a voting lottery game that consists only of the Stage 1 election, with the color of the jar revealed before voting.

PA treatment. Voters participate in a voting lottery game that consists only of the Stage 1 election, but the color of the jar is not revealed before voting.

The NPA and *PA treatments* are pure replications of Bouton et al. (2017), as Stage 2 does not exist. This situation reflects the primary election, in which voters compete only within their own political position for the election of a representative.[15]

Figure 2 shows the payoff matrix for the NPA and PA treatments, with payoffs in ECU (Experimental Currency Units). In this matrix, gray represents the minority candidate, and blue and red represent the majority candidates. If the winner's color matches the participant's ball color (i.e., if the preferred majority candidate wins the election), then the voter's payoff is 10 times greater than if the minority candidate wins. If the other majority candidate wins, the voter's payoff is 5.5 times greater.

FIGURE 2
The payoff matrix in treatments NPA and PA.

		Group Decision		
		Blue	Red	Gray
Your Ball	Blue	200	110	20
	Red	110	200	20

NPA+OA treatment. Voters participate in a voting lottery game with two election stages, Stage 1 and Stage 2. In Stage 1, the color of the jar in their group is revealed before they cast their ballots (i.e., NPA), whereas the winning color in Stage 1 is not necessarily the winning color in Stage 2 as well (i.e., OA).

PA+OA treatment. Voters participate in a voting lottery game with two election stages, Stage 1 and Stage 2. In Stage 1, the color of the jar in their group is revealed only after they have cast their ballots (i.e., PA), whereas the winning color in Stage 1 is not necessarily the winning color in Stage 2 as well (i.e., OA).

The NPA+OA and *PA+OA* treatments, both involving a Stage 2 election, represent our main innovation, even though voters are active only in Stage 1.[16] Here, Stage 1 reflects the primary election, while Stage 2 reproduces the upcoming general election.

In Figure 3, we report the payoff matrix, with payoffs in ECU, which implicitly compares the control treatments NPA and PA (Figure 2) and the main treatments NPA+OA and PA+OA.[17] In this matrix, if the drawn ball in Stage 2 matches the group's decision of Stage 1, then the group decision is applied, and the payoff structure is the same as Figure 2. Otherwise, the group decision is not applied. In the latter case, the voter's payoff is either 5 ECU or 15 ECU with equal probability, both lower than the lowest payoff they get when the group decision is applied (i.e., when the minority candidate wins the elections). In particular, a

[15]Detailed instructions provided to the participants for NPA and PA treatments are reported in Appendix C, Section C.1.

[16]Detailed instructions provided to the participants for NPA+OA and PA+OA treatments are reported in Appendix C, Section C.2.

[17]We adopt this payoff structure for two reasons. First, this type of structure is frequently used in traditional experimental papers investigating the voting strategies and equilibrium conditions (see, e.g., Forsythe et al., 1993; Forsythe et al., Forsythe et al. (1996)); Gerber et al., 1998; Reitz et al.; 1998). Second, it ensures full comparability with the results in Bouton et al. (2017).

black (resp., green) color in the second round gives 15 ECU to voters with blue (resp., red) preference in the first round.[18]

FIGURE 3
The payoff matrix in treatments NPA+OA and PA+OA.

		Group Decision Applied (probability = 1/3)			Group Decision NOT Applied	
		Blue	Red	Gray	Green (probability = 1/3)	Black (probability = 1/3)
Your Ball	Blue	200	110	20	5	15
	Red	110	200	20	15	5

Source of ambiguity. Across the four treatments (NPA, PA, NPA+OA, PA+OA), the two sources of preference ambiguity and outcome ambiguity arise depending on the specific features of the design, and they do not necessarily co-occur. Specifically, *preference ambiguity* occurs only when the jar color is not revealed before voting, which applies to the PA and PA+OA treatments. In contrast, *outcome ambiguity* arises whenever Stage 2 is introduced, regardless of whether preference ambiguity is present in Stage 1, since it reflects uncertainty about the final election result; this applies to the NPA+OA and PA+OA treatments.

4.2 Participants and Procedures

Experiments were conducted at two laboratories: the CIMEO Laboratory at Sapienza University in Rome (Italy) and the Kochi Laboratory at Kochi University of Technology (Japan). The CIMEO sessions involved 138 Italian participants, while the Kochi sessions involved 120 Japanese participants. The overall sample of 258 graduate and undergraduate students shows a prevalence of men (63.95%) over women (36.05%), and an overwhelming majority of Economics students (approximately 73.64%).

Each subject participated in only one session and each session was conducted using *z-Tree software* (Fischbacher, 2007). Multiple sessions were conducted for each treatment, with the number of subjects per session ranging from 24 to 36, as outlined in Table B1 of Appendix B. Each experimental session lasted approximately 80 minutes and followed identical procedures, as described below.

Before the experiment started, participants received detailed written instructions which were read aloud by one of the experimenters (see Experimental Instructions in Appendix C). Subsequently, participants answered a series of control questions to ensure their comprehension of the experimental game and procedures. Once the experiment began, participants engaged in one of the four treatments at a *between-subject level*. The treatment-dependent voting lottery game described in Section 4.1 was played for 60 consecutive rounds, with fixed groups of subjects (*paired matching*).[19] At the end of each of the 60 rounds, participants received

[18] The difference in payoff between black and green is introduced to represent the fact that in-group voters also have a preference over out-group candidates, even though the latter are not preferred over any in-group candidates. Thus, the black-blue and green-red combination of payoffs is just a color code with no strategic impact on voters. A black-red and green-blue combination of payoffs would give the same incentives to hope that the winning candidate in the second round is the one coming out of the primary elections within one's own group of voters. Furthermore, note that the parametrization of the payoff from out-group candidates winning the elections is such that the sum of the payoff from out-group winning is equal to the payoff from in-group minority candidate winning.

[19] The total number of rounds was reduced from 80 in Bouton et al. (2017) to 60 in our experimental design. This adjustment was necessary because of our extension with a second type of ambiguity, i.e., outcome ambiguity, which involved an additional random draw in NPA+OA and PA+OA treatments, thereby increasing participants' decision time and information processing per round. This 25% reduction in the original number of rounds allowed us to prevent potential "participant fatigue" – where individuals may become tired, bored, or disengaged, potentially compromising data quality – in the final rounds of the main treatments NPA+OA

feedback regarding (a) the number of votes assigned to each color in their group, (b) the selected jar, (c) the group decision, (d) the winner of the election, and (e) the final payoff for that round.

After the 60-round repeated experimental game, participants completed a final questionnaire providing socio-demographic information including age, gender, education level, field of study, levels of trust and risk aversion, and the importance of religion and politics in their lives.[20]

At the end of the experiment, the computer randomly selected 6 out of the 60 rounds to determine the final earnings of participants. Each of the 60 rounds had an equal probability of being selected.[21] Participants' earnings for these rounds were computed based on an exchange rate where 100 ECU = 1€ for Italian participants and 100 ECU = 200¥ for Japanese ones. This disparity in exchange rates between the two countries was crucial to maintaining purchasing power parity. On average, subjects earned 9.50€ (including the show-up fee of 4€) in Italy and 1616.31¥ (including the show-up fee of 1000¥) in Japan.[22]

4.3 Behavioral Hypotheses

In this Section, in line with the model and Propositions 1-4 derived in Section 3, we formulate our behavioral hypotheses.

According to Bouton et al. (2017), when voters' preferences about the candidates within their political position are known, an obvious strongest contender emerges. To avoid wasting their votes, voters defect from "non-viable" candidates to support "viable" ones by voting strategically (Lago, 2008). This means voting for the candidate with the highest probability of victory (Duverger, 1951). However, when the preference distribution is ambiguous and not revealed, voters lack an incentive to vote for a candidate other than their first choice. This leads to sincere voting becoming the prevailing strategy (Bouton et al., 2017). Therefore, replicating the same environmental condition proposed by Bouton et al. (2017) in the context of a primary election for a party's representative (i.e., Stage 1 of intra-positional election), without the pressure of an upcoming general election (i.e., without the Stage 2 of inter-positional election), two opposite trends may emerge: the PA treatment fosters sincere voting strategy while the NPA treatment prompts strategic voting under Duverger's law equilibrium. Hence, we test the following Hypothesis 0 as a control check.

Hypothesis 0. ***NPA vs PA***
Absent a general election, in a primary election, sincere voting emerges only when there is ambiguity about the preference distribution inside their political position.

However, when primaries are conducted in anticipation of an upcoming general election (as the most

and PA+OA. This helped minimize distortions relative to the control treatments NPA and PA. Additionally, it enabled us to maintain the same average duration for the experimental sessions in these new treatments as in the 80-round NPA and PA sessions of Bouton et al. (2017).

[20]Trust (resp., risk) attitude was assessed using a Likert scale ranging from 1 to 5, where 1 indicates strong trust reluctance (resp., full risk aversion), whereas 5 indicates a strong inclination towards trust (resp., risk acceptance). Similarly, the importance of religion (resp., politics) in their lives was measured on a Likert scale from 1 to 4, where 1 stands for "not important at all" and 4 stands for "very important".

[21]This is again comparable to the payment procedure of Bouton et al. (2017), who randomly selected 8 out of the 80 rounds (see footnote 19).

[22]The 100 ECU higher show-up fee in Japan compared to Italy was justified by the greater effort required of Japanese students to physically reach the laboratory, which is located on a different university campus from where they typically attend classes. This was not an issue for Italian students, as the laboratory is situated in the same building where they attend their classes. Despite this, there is no difference in the average payout of subjects since in Japan they earned 1616.31¥ $\approx$ 9.90€ (including the show-up fee of 1000¥ $\approx$ 6€).

typical case of US primary elections), the absence of ambiguity about the preference distribution inside the political position contrasts with the ambiguity regarding the political opponent that will be encountered in Stage 2 (NPA+OA treatment). Although outcome ambiguity may undermine voters' confidence, it primarily encourages more strategic behavior. Faced with such uncertainty, voters tend to coordinate more closely, supporting the candidate within their political position who is perceived as the strongest and most likely to succeed in the subsequent general election (Culbert, 2015), thus abandoning sincere voting in favor of strategic choice. This is perceived as the only rational behavior to increase their expected utility, which ultimately boosts the incentive to vote strategically in NPA+OA treatment (which already is the predicted behavior in NPA treatment). From this, we derive Hypothesis 1.

Hypothesis 1. ***NPA+OA***
With a general election bringing outcome ambiguity, strategic voting due to the knowledge of the strongest contender inside their own political position is boosted.

If strategic voting arises due to the knowledge of the strongest contender inside their own political position (knowledge tied to the revelation of preference distributions), then under conditions of preference ambiguity, voters have no incentive to strategize. In such cases, rational behavior dictates voting for the preferred candidate (Hypothesis 0). Now, if the preference ambiguity is combined with the outcome ambiguity (PA+OA treatment), we expect that the trend toward sincere voting will strengthen. The coexistence of these two types of ambiguity dictates that the only rational behavior is to vote sincerely for the preferred candidate: given the (even more) unpredictable outcome, voters align (even more) their choices with their political preferences. From this, we derive Hypothesis 2.

Hypothesis 2. ***PA+OA***
With a general election bringing outcome ambiguity, sincere voting due to preference ambiguity inside their own political position is boosted.

With Hypotheses 1 and 2, we state that the impact of outcome ambiguity on voting behavior is not unidirectional, but depends on the interplay with preference ambiguity. Based on this premise, we propose Hypothesis 3 as an extension of Hypothesis 0 to a two-stage voting environment with outcome ambiguity.

Hypothesis 3. ***NPA+OA vs PA+OA***
With a general election bringing outcome ambiguity, sincere voting emerges only when there is ambiguity about the preference distribution inside their own political position.

The outcome ambiguity in Stage 2 acts as a catalyst for the effects observed in Stage 1 regarding preference ambiguity (resp., no preference ambiguity), boosting sincere voting (resp., strategic voting).

Finally, since we conduct our analysis on two different subsamples, Italian and Japanese, we propose a last hypothesis, which works as a robustness check for Hypotheses 0-3

Hypothesis 4. ***No-country difference***
Voters' strategic behavior is independent from the subjects' sample (Italy vs. Japan) and country-related cultural differences.

Regardless of the actual cultural and political systems in which subjects are involved (Italy vs. Japan), common elements of preference and outcome ambiguity drive individuals to act in the same way (Reed, 2001; Cox and Schoppa, 2002). What drives voters to cast their ballot sincerely or strategically is solely related to the treatment-specific strategic factors and is independent of voters' political or cultural orientation. The latter eventually has second-order effects.

5. Experimental Results

In this section, we present the main results of the test of the behavioral hypotheses elaborated in Section 4.3. First, in Section 5.1, we validate *Hypothesis 0*, confirming Bouton et al. (2017) results on divergent voting strategies when accounting for ambiguous or non-ambiguous preference distributions. Then, in Section 5.2, we examine how introducing a second type of outcome ambiguity influences voting strategies based on information about the preference distribution (*Hypotheses 1–3*). Finally, in Sections 5.3 and 5.4, we verify whether context matters for voting strategies to validate *Hypothesis 4*.

5.1 The effect of preference ambiguity in one-stage (primary) election: a comparison between NPA and PA treatments

Before conducting an in-depth analysis of the behavioral voting strategy adopted under outcome ambiguity and the resulting equilibrium when transitioning from a one-stage to a two-stage election, we provide a summary analysis of the results when comparing the two control treatments, à la Bouton et al. (2017), i.e., NPA vs. PA. This preliminary step is intended to validate *Hypothesis 0* and lay a solid foundation for our investigation.

First, to analyze voters' behavior across the 60-round election, we focus on the frequency with which they adopt and maintain a certain strategy. We isolate a set of seven possible strategies: voting for blue, for red, for gray, sincere (i.e., voting for the color that matches their ball), opposite to sincere (i.e., the voter's decision is based on the majority/group decision, which does not correspond to the ball color), voting for the jar (i.e., voting for the color corresponding to the jar, so with the highest probability of winning), and voting opposite to the jar (i.e., for the majority color opposite to that of the selected jar). In PA treatment, where the preference distribution is not revealed, only the first five strategies remain feasible, as voters lack the information required to identify or oppose the color associated with the jar. Adapting the method of Bouton et al. (2017) to our design, a player's strategy is identified if they make the same choice for at least five consecutive rounds. If a player adopts more than one strategy within a period of rounds, we assign them the one employed most frequently over the 60 rounds. Table 2 reports the frequencies of the identified strategies in the two treatments, overall and classified by country.

In the NPA treatment, where the state of nature is revealed (i.e., the jar color is known), we observe that participants overwhelmingly adopt strategic behavior almost immediately, with 94.61% of choices reflecting this alignment. This confirms that, in the absence of ambiguity, individuals are highly capable of evaluating and adopting the necessary strategic behavior to maximize their utility (Tyszler and Schram, 2016). However, a comparison between Italy and Japan reveals a statistically significant difference in the degree of strategic behavior (Wilcoxon-Mann-Whitney test, $z = -2.258$, $p = 0.024$), with Japanese more likely to adopt strategic behavior that maximizes their utility compared to Italian participants. Unsurprisingly, the modal strategy is *Jar*, even if its adoption is significantly higher in Japan compared to Italy (Wilcoxon-Mann-Whitney test, $z = -1.761$, $p = 0.093$). This difference suggests that Japanese voters tend to exhibit more conservative behavior in making their choices, possibly opting for strategies that are more predictable and stable.[23].

In the PA treatment, we notice that in the absence of information regarding the state of nature, the overall percentage of *Identified strategies* decreases by approximately 20 percentage points compared to the NPA treatment. Interestingly, while the reduction is more pronounced for Italy, the decrease in Japan is relatively smaller. This difference is statistically significant (Wilcoxon-Mann-Whitney test, $z = -2.204$, $p = 0.032$), confirming that Japanese have more conservative behavior and are better at strategizing to maximize their utility. Considering the overall sample, the modal strategy is *Sincere*. This is confirmed for the Italian subsample, but not for the Japanese one. In the latter, voters equally split their votes between *Sincere* and *Blue*. This result gives support to Bouton et al. (2017) predictions and experimental findings of no unique type of strategy under preference ambiguity.[24].

TABLE 2. Frequencies of identified strategies in NPA and PA treatments

Strategies	**NPA Treatment**			**PA Treatment**		
	All	**Italy**	**Japan**	**All**	**Italy**	**Japan**
Blue	0.05	0.00	0.09	36.41	19.77	**51.60**
Red	12.18	25.37	0.09	5.44	10.97	0.38
Gray	0.00	0.00	0.00	0.00	0.00	0.00
Sincere	12.45	16.37	8.86	**54.11**	**61.73**	47.17
Opposite Sincere	0.05	0.10	0.00	4.04	7.54	0.84
Jar	**75.21**	**58.06**	**90.95**	–	–	–
Opposite Jar	0.05	0.10	0.00	–	–	–
% Identified Strategies	94.61	90.51	98.70	72.22	66.33	90.83

Note: Table 2 presents the average frequency with which each strategy is employed, both overall and separately for Italian and Japanese voters, in the NPA and PA treatments. *% Identified Strategies* represents the overall proportion of rounds (out of 60) in which a strategy was adopted. Instead, the frequency of individual strategies is calculated as the proportion of times each specific strategy was chosen relative to the total time that any strategy was adopted. The modal strategy for each country in each treatment is reported in bold.

In Table 3, we also provide a direct comparison of the two main types of strategies (categorized according to the two equilibria described in Section 3) under the NPA and PA treatments. We recall that the *Sincere* strategy involves casting a ballot for the color that matches the voter's ball, aligned with the Sincere voting equilibrium. On the other hand, strategies that are consistent with Duverger's law equilibria include those where voters coordinate their votes on *Blue* or *Red* (in both NPA and PA treatments), as well as those who vote for *Jar* or *Opposite Jar* (only in PA treatment).

We observe a clear difference in the treatments: among the identified strategies, the absence of clear information causes voters to reveal their true preferences. The percentage of sincere voting strategies hovers around 12% in the NPA treatment, but never falls below 50% in the PA treatment. Conversely, Duverger's law dominates under the NPA treatment and declines under the PA treatment. This suggests that ambiguity disrupts voters' ability to effectively coordinate on more strategic equilibria. Furthermore, the proportion of identified strategies decreases overall in the PA treatment, with a greater reduction among Italian voters

[23]More extensive analysis on the aggregate and individual strategic behavior under NPA treatment is reported in Appendix B, Section B.2

[24]More extensive analysis on the aggregate and individual strategic behavior under PA treatment is reported in Appendix B, Section B.3

than Japanese voters. This confirms that Japanese voters adhere more consistently to strategic behavior, even under ambiguity.

TABLE 3. Comparison of voting strategies across NPA and PA treatments

	% in NPA	% in PA	Wilcoxon-Mann-Whitney
PANEL A - All			
Sincere	12.45	54.11	$p < 0.001$***
Duverger's law	87.44	41.85	$p < 0.001$***
Identified strategies	94.61	72.22	$p = 0.004$**
PANEL B - Italy			
Sincere	16.37	61.73	p=0.004**
Duverger's law	83.43	30.74	p=0.004**
Identified strategies	90.51	66.33	p=0.009**
PANEL C - Japan			
Sincere	8.86	47.17	p=0.038*
Duverger's law	91.13	51.98	p=0.038*
Identified strategies	98.70	90.83	p=0.038*

Note: Table 3 reports the average frequency of voters employing the *Sincere* and *Duverger's law* strategies, both overall and separated by country, in the NPA and PA treatments. *** p < 0.001, ** p < 0.01, * p < 0.05.

Result 1: *In the presence of ambiguity (PA treatment), sincere voting emerges as a safer and more straightforward choice, as uncertainty complicates strategic coordination. Conversely, when complete information is available (NPA treatment), Duverger's law strategies dominate.*

Overall, Result 1 validates Hypothesis 0.

5.2 Comparative analysis of voting strategies under outcome ambiguity

Now, we extend our analysis by examining voters' strategies when outcome ambiguity is introduced. First, we separately analyze the two possible scenarios: (i) when outcome ambiguity in Stage 2 is preceded by no preference ambiguity in Stage 1 (i.e., NPA+OA treatment), and (ii) when it is preceded by preference ambiguity in Stage 1 (i.e., PA+OA treatment). Subsequently, we compare (i) and (ii) to assess the extent to which preference ambiguity influences voters' behavior under outcome ambiguity.

5.2.1 *NPA+OA: Voters' behavior under no preference ambiguity but outcome ambiguity*

Voters' behavior in the NPA+OA treatment remains largely consistent with that in the NPA treatment: with access to a public signal about the state of nature in Stage 1 and an understanding of the potential for higher payoffs (if the second draw aligns with their group's decision), participants predominantly adopt a strategic approach, casting votes for the jar. This behavior accounts for 86.87% of the choices across the 60 rounds, with a statistically significant difference between Japanese compared to Italian (94.39% vs 79.35%, Wilcoxon-Mann-Whitney test, $z = 2.739$, $p = 0.004$), although there is homogeneity within groups of the same country. Additionally, as in the NPA treatment, this tendency of voting for the jar is associated with a higher level of sincere voting (approximately 65%). This result is not surprising, as two-thirds of the balls received by voters remain compatible with the jar's color, reinforcing sincere voting. These findings confirm that individuals tend to follow Duverger's Law Equilibrium by voting for the randomly selected jar, even in the absence of knowledge about their future opponents.

Looking at the distribution of strategies, in Table 4, we observe that the modal strategy is voting for the *Jar*, which is chosen in more than three-fourths of the cases. The frequency is consistently higher in Japan compared to Italy, suggesting that, as under NPA treatment, the Japanese are good at strategizing and coordinating around the voting strategy that allows them to maximize their expected utility (Wilcoxon-Mann-Whitney test, $z = 1.826$, $p = 0.008$). This behavior is also consolidated by the *% Identified Strategies*, where the frequency in Japan is relatively higher compared to that of Italy (Wilcoxon-Mann-Whitney test, $z = 2.739$, $p = 0.004$).[25] Furthermore, no other strategy appears to be played consistently, resulting in the group's decision consistently aligning with the color of the selected jar.

TABLE 4. Frequencies of identified strategies in NPA+OA treatment

Strategies	**All**	**Italy**	**Japan**
Blue	0.37	0.76	0.00
Red	0.21	0.44	0.00
Gray	0.00	0.00	0.00
Sincere	7.30	8.01	6.63
Opposite Sincere	1.99	3.91	0.19
Jar	**88.15**	**82.78**	**93.19**
Opposite Jar	1.99	4.10	0.00
% identified strategies	82.68%	73.38	93.83

Note: Table 4 presents the average frequency with which each strategy is employed, both overall and separately by country, in the NPA+OA treatment. *% Identified Strategies* represents the overall proportion of rounds (out of 60) in which a strategy was adopted. Instead, the frequency of individual strategies is calculated as the proportion of times each specific strategy was chosen relative to the total time that any strategy was adopted. The modal strategy for each country in each treatment is reported in bold.

To strengthen our findings of higher persistence of Duverger's law strategic voting under the NPA+OA treatment compared to the NPA treatment and to validate *Hypothesis 1*, Table 5 presents a comparison of the frequency with which the two main strategies are adopted across the two treatments. We note that the presence of outcome ambiguity diminishes voters' ability to establish and maintain a consistent strategy over time. This is evident in the *Identified strategies* variable, with a greater significance for the Italian subsample rather than the Japanese subsample. However, when considering only the rounds in which a strategy among *Sincere* and *Duverger's law* is adopted, no significant differences are found between the two treatments. In scenarios featuring solely outcome ambiguity, individuals, much like in the NPA treatment, persist in strategic voting behavior, leaning towards a Duverger's law Equilibrium and voting for the selected jar more than in the NPA treatment (with no outcome ambiguity). Indeed, the frequency of strategic voting according to Duverger's law is not significantly higher in the NPA+OA treatment with respect to the NPA treatment. However, this might be because this frequency was already quite high (more than 90% in the Japanese subsample, more than 80% in the Italian subsample) in the NPA treatment, hence empirically there was not much room left for a significant increase. The fact that the frequency of sincere voting decreases (although not significantly so) in both subsamples supports our interpretation.

Result 2: *When outcome ambiguity is introduced, information on preference distribution strengthens voters' strategic behavior of supporting the strongest contender (i.e., the jar color).*

[25]More extensive analysis of aggregate and individual behavior in groups under NPA+OA treatment is provided in Appendix B, Section B.4.

TABLE 5. Comparison of behavioral strategies across NPA and NPA+OA treatments

	% in NPA	% in NPA+OA	Wilcoxon-Mann-Whitney
PANEL A - All			
Sincere	12.45	7.30	p=0.379
Duverger's law	87.44	88.73	p=0.786
Identified strategies	94.61	82.68	p=0.009**
PANEL B - Italy			
Sincere	16.37	8.01	p=0.240
Duverger's law	83.43	83.98	p=0.589
Identified strategies	90.51	73.38	p=0.004**
PANEL C - Japan			
Sincere	8.86	6.63	p=0.931
Duverger's law	91.13	93.19	p=1
Identified strategies	98.70	93.83	p=0.048*

Note: Table 5 reports the average frequency of voters employing the *Sincere* and *Duverger's law* strategies, both overall and separated by country, in the NPA and NPA+OA treatments. *** p < 0.001, ** p < 0.01, * p < 0.05.

Overall, Result 2 validates Hypothesis 1.

5.2.2 *PA+OA: Voters' behavior under preference and outcome ambiguity*

Voters' behavior in the PA+OA treatment remains largely consistent with that analyzed in the PA treatment, with voters predominantly voting for the color matching to their ball. This occurs more frequently there than in the PA treatment, with 79.34% of cases across all rounds, regardless of possible strategies. It is observed predominantly among Japanese participants, who display a stronger ability to coordinate around the most straightforward choice even under complex and ambiguous conditions (Wilcoxon-Mann-Whitney test, z = 2.008, p = 0.052).

Focusing on the frequency distribution of strategies, in Table 6, we observe that the modal choice is *Sincere*, corresponding to more than three-fourths of identified strategies, with no country differences. The remaining one-fourth of the identified strategies are roughly equally split between *Blue* and *Red*, with *Blue* being more common in the Italian subsample and *Red* in the Japanese one. This result indicates that under heightened ambiguity, voters tend to converge toward sincere voting, significantly increasing its adoption rate to the point where it becomes the dominant or nearly exclusive choice. Additionally, the coexistence of preference and outcome ambiguity reduces voters' ability to define and maintain consistent strategies over time. This is reflected in the *% Identified Strategies*, which, while consistent, is lower compared to previous treatments. Specifically, the percentage is lower among Italians than among Japanese (Wilcoxon-Mann-Whitney test, z = 2.556, p = 0.009), reinforcing the idea that Japanese exhibit a greater tendency to coordinate around a defined strategy.[26]

To further explore how outcome ambiguity influences preference ambiguity – and to validate *Hypothesis 2* – Table 7 compares the frequency of the two main strategies across the PA and PA+OA treatments. We notice that voters exhibit a similar ability to identify and adopt a conservative voting strategy over 60 rounds, regardless of the type of ambiguity they face. However, the heightened level of ambiguity in the PA+OA

[26]More detailed analysis of the aggregate and individual behavior in groups is reported in Appendix B, Section B.5.

TABLE 6. Frequencies of identified strategies in PA+OA treatment

Strategies	**All**	**Italy**	**Japan**
Blue	8.03	15.58	1.71
Red	11.66	4.92	17.30
Gray	0.00	0.00	0.00
Sincere	**78.28**	**76.85**	**79.47**
Opposite Sincere	2.03	2.65	1.52
% identified strategies	73.23	61.20	87.66

Note: Table 6 presents the average frequency with which each strategy is employed, both overall and separately by country, in the PA+OA treatment. *% Identified Strategies* represents the overall proportion of rounds (out of 60) in which a strategy was adopted. Instead, the frequency of individual strategies is calculated as the proportion of times each specific strategy was chosen relative to the total time that any strategy was adopted. The modal strategy for each country in each treatment is reported in bold.

treatment seems to push voters toward a stronger preference for *Sincere* strategy, with an overall increase of approximately 24 percentage points. The increase is more pronounced among Japanese (38%) compared to Italians (15%). At the same time, the inclination toward following the *Duverger's law* decreases significantly. Although these shifts in strategy adoption are substantial, the differences are not statistically significant. This suggests that, while the presence of additional ambiguity influences behavior to some extent, the overall strategic approach remains largely consistent.

TABLE 7. Comparison of behavioral strategies across PA and PA+OA treatments

	% in PA	% in PA+OA	Wilcoxon-Mann-Whitney
PANEL A - All			
Sincere	54.11	78.28	p=0.095
Duverger's law	41.85	19.69	p=0.201
Identified strategies	72.22	73.23	p=0.503
PANEL B - Italy			
Sincere	61.73	76.85	p=0.429
Duverger's law	30.74	20.50	p=0.537
Identified strategies	66.33	61.20	p=0.537
PANEL C - Japan			
Sincere	47.17	79.47	p=0.191
Duverger's law	51.98	19.01	p=0.191
Identified strategies	90.83	87.66	p=0.556

Note: Table 5 reports the average frequency of voters employing the *Sincere* and *Duverger's law* strategies, both overall and separated by country, in the PA and PA+OA treatments. *** p < 0.001, ** p < 0.01, * p < 0.05.

Result 3: *When outcome ambiguity follows preference ambiguity, sincere voting prevails, although the overall strategic behavior does not differ significantly from PA treatment.*

Overall, Result 3 validates Hypothesis 2.

5.2.3 *NPA+OA vs PA+OA: The effect of (no)preference ambiguity in the environment of outcome ambiguity*

In Table 8, we extend our investigation by directly comparing the main strategies adopted in the NPA+OA and PA+OA treatments, i.e., where outcome ambiguity in Stage 2 remains constant while the knowledge about preference distribution in Stage 1 differs. We observe that *Sincere* is the modal strategy only in the PA+OA treatment, while *Duverger's law* remains the dominant strategy in the NPA+OA treatment. The significant difference in the frequency with which these two strategies are adopted between the two treatments ($p < 0.001$) indicates that the knowledge about the preference distribution in Stage 1 plays a crucial role in shaping voters' strategic choices. In the NPA+OA treatment, outcome ambiguity causes voters to make strategic decisions and align with the majority, which may consolidate support for a particular outcome. In contrast, in the PA+OA treatment, voters tend to rely more on their first-best preference. This is likely due to the combination of unclear preferences and outcome uncertainty, which pushes voters toward simpler, non-strategic choices.

This comparison between NPA+OA and PA+OA treatments yields results consistent with those obtained when comparing the NPA and PA treatments, albeit with a higher significance, overall and by country. This is further evidence that outcome ambiguity amplifies the effects triggered by (no)preference ambiguity.

TABLE 8. Comparison of behavioral strategies across NPA+OA and PA+OA treatments

	% in NPA+OA	% in PA+OA	Wilcoxon-Mann-Whitney
PANEL A - All			
Sincere	7.30	78.28	p<0.001***
Duverger's law	88.73	19.69	p<0.001***
Identified strategies	82.68	73.23	p=0.120
PANEL B - Italy			
Sincere	8.01	76.85	p= 0.002**
Duverger's law	83.98	20.50	p=0.002**
Identified strategies	73.38	61.20	p=0.015*
PANEL C - Japan			
Sincere	6.63	79.47	p=0.008**
Duverger's law	93.19	19.01	p=0.008**
Identified strategies	93.83	87.66	p=0.254

Note: Table 8 reports the average frequency of voters employing the *Sincere* and *Duverger's law* strategies, both overall and separated by country, in the NPA+OA and PA+OA treatments. *** p < 0.001, ** p < 0.01, * p < 0.05.

Result 4: *Outcome ambiguity amplifies the effects triggered by preference ambiguity, reinforcing the convergence toward Duverger's law. Similarly, when there is no preference ambiguity, outcome ambiguity intensifies the emergence of the sincere voting strategy, making it the dominant choice.*

Overall, Result 4 validates Hypothesis 3.

5.3 Cross-country comparison

Since the experiment was implemented in two national settings, Italy and Japan, which differ substantially in their electoral institutions and political culture, this section discusses a direct comparison of the results across the four different treatments. This comparison evaluates whether our findings reflect universal behavioral patterns or are conditioned by country-specific factors (taking into account that, in Italy, primaries have been a feature of political life in the last twenty years, while they are absent in Japan).

Results from Tables 3, 5, 7 and 8 already show that subjects exposed to the same ambiguous treatments adopt the same voting strategies, i.e., a sincere voting strategy under preference ambiguity and a strategic one under no preference ambiguity, with effects boosted by outcome ambiguity (aligning the findings of Reed, 2001 and Cox and Schoppa, 2002). However, the intensity with which these strategies are adopted differs slightly by country. Table 9 highlights this variation, showing that the only statistically significant difference across Italy and Japan concerns the frequency with which participants adopt and preserve a given strategy over time (i.e., *Identified strategies* variable). Japanese participants display more conservative behavior: they tend to adopt a specific voting strategy within the first 5–10 rounds of the game and maintain it consistently until the end. By contrast, Italian participants show more variability: they require more rounds before settling on a stable strategy and are more likely to change their approach multiple times over the 60 rounds, indicating a lower ability to sustain a consistent voting pattern.

These behavioral patterns are linked to the different institutional and cultural contexts in which the two subsamples of participants reside. The Japanese are accustomed to stability and continuity in political dynasties (Miwa et al., 2023), and are characterized by a peaceful and cooperative approach to the electoral system, which justifies their conservative behavior. Italians, on the other side, are accustomed to continuous political instability and distrust in the electoral system, making them more vulnerable in their choices (Sandri and Seddone, 2015).

TABLE 9. Cross-country comparison of behavioral strategies by treatment

	% in Italy	% in Japan	Wilcoxon-Mann-Whitney
PANEL A - NPA treatment			
Sincere	16.37	8.86	p=0.180
Duverger's law	83.43	91.13	p=180
Identified strategies	90.51	98.70	p=0.024*
PANEL B - PA treatment			
Sincere	61.73	47.17	p=0.556
Duverger's law	30.74	51.98	p=0.413
Identified strategies	66.33	90.83	p=0.032*
PANEL C - NPA+OA treatment			
Sincere	8.01	6.63	p=0.429
Duverger's law	83.98	93.19	p=0.126
Identified strategies	73.38	93.83	p=0.004**
PANEL D - PA+OA treatment			
Sincere	76.85	79.47	p=1
Duverger's law	20.50	19.01	p=0.931
Identified strategies	61.20	87.66	p=0.004**

Note: *** p < 0.001, ** p < 0.01, * p < 0.05.

Result 5: *Regardless of the country, subjects exposed to the same ambiguous scenario adopt the same voting strategy. However, Japanese participants are more adept at maintaining strategic behavior over time and across outcome ambiguity, consistently coordinating around the strategy that maximizes their expected utility.*

Overall, Result 5 partially validates Hypothesis 4.

5.4 Regression analysis

We employ a Tobit regression analysis to inform our discussion of the differences in subjects' strategic behavior. The model is specified as follows:

$$y_i = \beta_1 \cdot Country + \beta_2 \cdot Treatment + \beta_3 \cdot Country \cdot Treatment + \beta_4 \cdot X_i + \varepsilon_i \qquad (6)$$

The outcome of interest y_i is a continuous variable ranging from 0 to 1, representing the relative frequency with which subjects adopt a voting strategy (either Sincere or Duverger's law) over the 60 rounds. *Country* is a dummy variable assuming value 1 for Japan and 0 otherwise. *Treatment* refers to the treatment of interest, assuming NPA treatment as the reference variable. X_i includes a vector of socio-demographic controls (e.g., Age, Gender, Year of Education, Economics studies, Risk and Trust attitude, Religion, and Politics).[27]

The results of this analysis are reported in Table 10. For completeness, Model 1 includes all variables without the interaction term between *Country* and *Treatment*, while Model 2 introduces this interaction.

Among the control variables, *Year of Education* is the only one that has a positive and significant coefficient, suggesting that as the level of education increases, subjects are more inclined to adopt a long-term voting strategy.

Interestingly, *Country* also shows a positive and statistically significant coefficient (even if only in Model 1), suggesting that the country of residence significantly influences the frequency of adopting a voting strategy. Specifically, using Italy as a reference variable, we observe that participants from Japan tend to adopt a voting strategy much more frequently than Italians and are more conservative in their voting strategies.

Moreover, assuming *Treatment NPA* as the reference variable for the treatment condition, and comparing it with *Treatment PA*, *Treatment NPA+OA*, and *Treatment PA+OA*, we observe that the introduction of an ambiguity condition reduces the likelihood of strategic behavior. This effect is strongest when considering preference ambiguity ($p < 0.001$ for Treatments PA or PA+OA) compared to solely outcome ambiguity ($p < 0.05$ for Treatment NPA+OA). Similar results in both Model 1 and Model 2 confirm our prediction that as the types of ambiguity increase, individuals are less able to define and preserve a strategy, and this trend is mostly driven by preference ambiguity.

Finally, in Model 2, the introduction of the interaction term between the country of residence and the treatment variables yields no significant correlation, indicating that the relationship between the country of residence and the treatment conditions does not have a significant impact on the outcome variable, thus confirming that differences in the frequency of adopting a voting strategy (which is higher in the Japanese sample) do not convert in significant differences in the adopted voting strategy, given the treatment.

Result 6: *Under identical ambiguous conditions, voters' strategic behavior does not depend on the country of origin or cultural differences*

Thus, Result 6 validates Hypothesis 4. The variation lies not in the choice of strategy but at utmost in the degree to which that strategy is adopted.

[27] In Table B.6 of Appendix B we report summary statistics of these variables, including mean and standard deviation of the whole sample, checking if there is a significant statistical difference between countries.

TABLE 10. Tobit regression of strategic behavior over 60 rounds

	Model 1	Model 2
Age	0.006	0.008
	(0.009)	(0.009)
Gender	-0.402	-0.042
	(0.034)	(0.034)
Year of Education	0.039**	0.036*
	(0.015)	(0.015)
Economics	-0.026	-0.022
	(0.044)	(0.043)
Risk	-0.020	-0.020
	(0.019)	(0.019)
Trust	0.017	0.018
	(0.016)	(0.016)
Religion	-0.038	-0.040
	(0.020)	(0.020)
Politics	-0.035	-0.038
	(0.021)	(0.021)
Country (Japan = 1)	0.202***	0.131
	(0.048)	(0.071)
Treatment PA	-0.243***	-0.286***
	(0.046)	(0.060)
Treatment NPA+OA	-0.126**	-0.161**
	(0.046)	(0.060)
Treatment PA+OA	-0.279***	-0.331***
	(0.045)	(0.060)
Country × Treatment NPA		0.103
		(0.093)
Country × Treatment NPA+OA		0.078
		(0.090)
Country × Treatment PA+OA		0.118
		(0.089)
logSigma	-1.457***	-1.466***
	(0.055)	(0.055)
Observations	258	258

Note: Table 10 reports estimation results for the Tobit model in Eq.6. *Age* is a continuous variable ranging from 18 to 60 years. *Gender* is a dummy variable equal to 1 for females, 0 otherwise. *Years of Education* is a discrete variable indicating the total number of years of formal schooling from 1 to 9. *Economics* is a dummy variable equal to 1 if the participant is an economics student, 0 otherwise. *Risk* and *Trust* are categorical variables measured on a five-point scale, where 1 indicates full risk aversion (resp., strong distrust) and 5 indicates full risk acceptance (resp., strong trust). *Religion* and *Politics* are categorical variables measured on a four-point scale, where 1 denotes “not important at all”and 4 denotes “very important”. *Country* is a dummy variable equal to 1 for Japan, 0 otherwise. *Treatment PA*, *Treatment NPA+OA*, and *Treatment PA+OA* are dummy variables equal to 1 if the corresponding treatment was experienced by the participant and 0 otherwise.
Robust standard errors are reported in parentheses. ***p<0.001, **p<0.01, *p<0.5

6. Conclusions

This paper has examined how the preference and outcome ambiguities generated by primary elections influence the convergence of voters' choices toward the Sincere voting equilibrium, throughout a theory-driven experiment.

Although one may expect that ambiguity triggers a higher degree of coordination on sincere voting, our results show that its impact on voting strategies may vary, depending on the different configurations experienced. First, comparing NPA and PA treatments, we confirm that in absence of preference ambiguity, voters correctly anticipate the expected ranking and coordinate their votes around the strongest contender, thereby voting strategically following Duverger's law. However, when preference ambiguity occurs, there is a strong convergence toward a Sincere voting strategy. These findings provide internal validity to Bouton et al. (2017) results, as we conducted our experiments in two countries different from the one where their study was run (Spain), and culturally different among them (Italy and Japan), obtaining the same results. Second, by combining one-stage preference ambiguity with a second-stage outcome ambiguity, we confirm our theoretical prediction of the amplification of the opposite behaviors observed in NPA vs. PA. Comparing NPA with NPA+OA, voters converge on the most viable candidate in both cases, but strategic coordination is stronger under NPA+OA. Since outcome ambiguity is exogenous and each candidate has the same probability of winning with a lower expected payoff, voters have an even greater incentive to back the strongest contender to mitigate risk. Conversely, when comparing PA with PA+OA, the coexistence of preference and outcome ambiguity further undermines coordination, reinforcing sincere voting as the safer and more justifiable choice. The absence of significant differences between a one-stage primary election and a two-stage primary-general election may be due to opposite effects that our design is not meant to assess. Introducing an additional electoral stage could, on the one hand, complicate the calculation of expectations regarding the electoral outcome. On the other hand, it might stimulate a fear-of-regret strategy: the former diminishes, while the latter enhances the psychological motivation for strategic voting. Disentangling these two motivations at the level of individual voters exceeds the scope of this paper and warrants further investigation despite its significance. For example, if voters fear regretting their primary election choices, this could increase their skepticism toward democratic processes. Such concerns have been reflected in various countries through surveys or even through violent protests in response to unexpected but legitimate electoral outcomes. Finally, when we examine whether these results vary between the two countries in which the experiments are conducted, we notice that subjects exposed to the same ambiguous scenarios adopt the same voting strategies, even if the degree to which a certain voting strategy is adopted varies slightly according to the country of residence and the correlated political-institutional perception.

Although these results provide clear evidence for the behavioral role of ambiguity, their external validity requires caution. Laboratory environments exclude many real-world factors that shape electoral behavior. For example, in actual primaries, voters are influenced by media narratives about candidate viability, polling data, and strategic endorsements. Our design abstracts from these informational cascades, which could mitigate or exacerbate the effects of ambiguity. Similarly, our model treats primary and general elections as sequential but insulated processes. In reality, primary outcomes often shift perceptions of electability in the general election. For instance, Emmanuel Macron's rise in France's 2017 presidential election was partly enabled by divisions in the left primary and voters' perceptions of second-round viability. Finally, our controlled setting excludes broader contextual variables – such as turnout heterogeneity, campaign shocks, or social identities – that are central in the field.

Moreover, we underline two other limitations of our study that deserve further investigation. First, we chose not to incorporate the endogenous probability of winning the general elections based on the number of votes the winning candidate would receive in the primaries. We avoided adding this further manipulation in order to maintain consistency with the approach of Bouton et al. (2017) and avoid the introduction of confounders. Second, strategic behavior during a primary election may depend on other primaries simultaneously or sequentially performed by opposite political parties. We acknowledge that this would require a much more sophisticated design, which might be weaker in terms of experimental controls. However, it would dramatically increase the external validity of experimental voting games in explaining electoral competition in democracies, to which our study has tried to provide a first contribution.

References

Abramson, P. R., Aldrich, J. H., Diamond, M., Diskin, A., Levine, R., and Scotto, T. J. (2004). Strategic abandonment or sincerely second best? The 1999 Israeli prime ministerial election. *Journal of Politics*, 66(3):706–728.

Abramson, P. R., Aldrich, J. H., Paolino, P., and Rohde, D. W. (1992). "Sophisticated" voting in the 1988 presidential primaries. *American Political Science Review*, 86(1):55–69.

Alvarez, R. M. and Nagler, J. (2000). A new approach for modelling strategic voting in multiparty elections. *British Journal of Political Science*, 30(1):57–75.

Blais, A. and Carty, R. K. (1991). The psychological impact of electoral laws: measuring Duverger's elusive factor. *British Journal of Political Science*, 21(1):79–93.

Blais, A., Labbé-St-Vincent, S., Jean-François, L., Sauger, N., and Van der Straeten, K. (2011). Strategic vote choice in one-round and two-round elections: an experimental study. *Political Research Quarterly*, 64(3):637–645.

Blais, A., Laslier, J.-F., Laurent, A., Sauger, N., and Van der Straeten, K. (2007). One-round vs two-round elections: An experimental study. *French Politics*, 5:278–286.

Bouton, L. (2013). A theory of strategic voting in runoff elections. *American Economic Review*, 103(4):1248–1288.

Bouton, L. and Castanheira, M. (2012). One person, many votes: Divided majority and information aggregation. *Econometrica*, 80(1):43–87.

Bouton, L., Castanheira, M., and Llorente-Saguer, A. (2017). Multicandidate elections: Aggregate uncertainty in the laboratory. *Games and Economic Behavior*, 101:132–150.

Bouton, L., Gallego, J., Llorente-Saguer, A., and Morton, R. (2022). Run-off elections in the laboratory. *The Economic Journal*, 132(641):106–146.

Bouton, L. and Gratton, G. (2015). Majority runoff elections: strategic voting and Duverger's hypothesis. *Theoretical Economics*, 10(2):283–314.

Cherry, T. L. and Kroll, S. (2003). Crashing the party: An experimental investigation of strategic voting in primary elections. *Public Choice*, 114(3-4):387–420.

Cox, G. W. (1997). *Making votes count: strategic coordination in the world's electoral systems*. Cambridge University Press.

Cox, G. W. and Shugart, M. S. (1996). Strategic voting under proportional representation. *The Journal of Law, Economics, and Organization*, 12(2):299–324.

Cox, K. E. and Schoppa, L. J. (2002). Interaction effects in mixed-member electoral systems: theory and evidence from Germany, Japan, and Italy. *Comparative Political Studies*, 35(9):1027–1053.

Culbert, G. (2015). Realizing “strategic” voting in presidential primaries. *Rationality and Society*, 27(2):224–256.

Dewan, T. and Myatt, D. P. (2007). Leading the party: Coordination, direction, and communication. *American Political Science Review*, 101(4):827–845.

Di Tella, R., Kotti, R., Le Pennec, C., and Pons, V. (2025). Keep your enemies closer: strategic platform adjustments during US and French elections. *American Economic Review*, 115(8):2488–2528.

Dolez, B. and Laurent, A. (2010). Measuring Duvergerian effects of the French majority runoff system with laboratory experiments: Duverger’s laws under the microscope. In *In Situ and Laboratory Experiments on Electoral Law Reform: French Presidential Elections*, pages 105–121. Springer.

Downs, A. (1957). An economic theory of democracy. *Harper and Row*, 28.

Duverger, M. (1951). *Les partis politiques*. Paris: Colin.

Fey, M. (1997). Stability and coordination in Duverger’s law: A formal model of preelection polls and strategic voting. *American Political Science Review*, 91(1):135–147.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10:171–178.

Fisher, S. D. and Myatt, D. P. (2002). Strategic voting experiments. Technical report, Nuffield College Politics Working Paper 2002-W4.

Fisher, S. D. and Myatt, D. P. (2017). Strategic voting in plurality rule elections. *Unpublished manuscript, London Business School*.

Forsythe, R., Myerson, R. B., Rietz, T. A., and Weber, R. J. (1993). An experiment on coordination in multi-candidate elections: The importance of polls and election histories. *Social Choice and Welfare*, 10:223–247.

Forsythe, R., Rietz, T., Myerson, R., and Weber, R. (1996). An experimental study of voting rules and polls in three-candidate elections. *International Journal of Game Theory*, 25:355–383.

Gerber, E. R., Morton, R. B., and Rietz, T. A. (1998). Minority representation in multimember districts. *American Political Science Review*, 92(1):127–144.

Giannetti, D. and Grofman, B. (2011). *A natural experiment on Electoral Law reform: evaluating the long run consequences of 1990s electoral reform in Italy and Japan*, volume 24. Springer Science & Business Media.

Hausladen, C. I., Hu, S.-H., and Levin, J. M. (2024). Replicating "Run-off elections in the laboratory". Technical report, I4R Discussion Paper Series.

Lago, I. (2008). Rational expectations or heuristics? Strategic voting in proportional representation systems. *Party Politics*, 14(1):31–49.

Louis, P., Troumpounis, O., Tsakas, N., and Xefteris, D. (2022). Coordination with preferences over the coalition size. *Journal of Economic Behavior & Organization*, 194:105–123.

Mandler, M. (2012). The fragility of information aggregation in large elections. *Games and Economic Behavior*, 74(1):257–268.

McKelvey, R. D. (1972). A general theory of the calculus of voting. *Mathematical Applications in Political Science*.

Merrill, S. (1982). Strategic voting in multicandidate elections under uncertainty and under risk. In *Power, Voting, and Voting power*, pages 179–187. Springer.

Miwa, H., Kasuya, Y., and Ono, Y. (2023). Voters' perceptions and evaluations of dynastic politics in Japan. *Asian Journal of Comparative Politics*, 8(3):671–688.

Myatt, D. P. (2007). On the theory of strategic voting. *The Review of Economic Studies*, 74(1):255–281.

Myatt, D. P. (2017). A theory of protest voting. *The Economic Journal*, 127(603):1527–1567.

Myerson, R. B. and Weber, R. J. (1993). A theory of voting equilibria. *American Political Science Review*, 87(1):102–114.

Palfrey, T. R. (1988). *A mathematical proof of Duverger's law*. California Institute of Technology.

Palfrey, T. R. and Rosenthal, H. (1990). *Testing game-theoretic models of free riding: New evidence on probability bias and learning*. Cambridge, Mass.: Dept. of Economics, Massachusetts Institute of Technology.

Reed, S. R. (1994). Democracy and the personal vote: A cautionary tale from Japan. *Electoral Studies*, 13(1):17–28.

Reed, S. R. (2001). Duverger's law is working in Italy. *Comparative Political Studies*, 34(3):312–327.

Reitz, T., Myerson, R., and Weber, R. (1998). Campaign finance levels as coordinating signals in three-way, experimental elections. *Economics & Politics*, 10(3):185–218.

Rosenstone, S. J. (1993). *Mobilization, participation, and democracy in America*. Macmillan.

Samuels, R. J. (2019). *Machiavelli's children: leaders and their legacies in Italy and Japan*. Cornell University Press.

Sandri, G. and Seddone, A. (2015). Sense or sensibility? Political attitudes and voting behaviour of party members, voters, and supporters of the Italian centre-left. *Italian Political Science Review/Rivista Italiana di Scienza Politica*, 45(1):25–51.

Sandri, G., Seddone, A., and Venturino, F. (2015). *Party primaries in comparative perspective*. Ashgate Publishing, Ltd.

Taagepera, R. and Shugart, M. S. (1989). Seats and votes: The effects and determinants of electoral systems. *New Haven: Yale University Press*.

Tyszler, M. and Schram, A. (2016). Information and strategic voting. *Experimental Economics*, 19:360–381.

Van der Straeten, K., Sauger, N., Laslier, J.-F., Blais, A., et al. (2010). The mechanical and psychological effects of electoral systems: An appraisal with experimental data. Technical report, CEPREMAP.

Xefteris, D. (2019). Strategic voting when participation is costly. *Games and Economic Behavior*, 116:122–127.

A. Appendix A - Mathematical proof

A.1 Pivotal probabilities and payoffs

Since we have assumed that in each political position P_i, voting for the minority candidate C_i is a dominated strategy for both types t_{A_i} and t_{B_i} voters while it is dominant for type t_{C_i} voter, who is indifferent between A_i and B_i. Then, each type t_{A_i} and t_{B_i} voter makes their voting decision for A_i and B_i considering their type and the belief formed after the public signal. Since they do not know the type distribution inside P_i nor outside, they base their decision on the expected value of each action, which depends on pivotal events.

Denoting $piv_{Q_iR_i}$ the event at which a voter can be pivotal in determining the outcome voting for Q_i instead of R_i, we focus on the specific case in which C_i-voters are a large minority with n_{C_i} voters (i.e., $C_i = n_{C_i}$), such that $n_{A_iB_i} - 1 > n_{C_i} > \frac{n_{A_iB_i}}{2}$. This means that A_i and B_i will never be pivotal, hence $piv_{A_iB_i} = 0$.

The probabilities of pivotal events are essentially two, and occur only when the two candidates have exactly the equal share of votes or at least one vote of difference:

$$p_{A_iC_i} = Pr(piv_{A_iC_i}|\omega_i) = \frac{(n-1)!}{2} \frac{\left(\tau_{A_i}^{\omega_i}\right)^{n_{C_i}-1} \left(\tau_{B_i}^{\omega_i}\right)^{n_{A_iB_i}-n_{C_i}-1}}{(n_{C_i}-1)!(n_{A_iB_i}-n_{C_i}-1)!} \left(\frac{\tau_{A_i}^{\omega_i}}{n_{C_i}} + \frac{\tau_{B_i}^{\omega_i}}{(n-n_{C_i})}\right)$$

$$p_{B_iC_i} = Pr(piv_{B_iC_i}|\omega_i) = \frac{(n-1)!}{2} \frac{\left(\tau_{B_i}^{\omega_i}\right)^{n_{C_i}-1} \left(\tau_{A_i}^{\omega_i}\right)^{n_{A_iB_i}-n_{C_i}-1}}{(n_{C_i}-1)!(n_{A_iB_i}-n_{C_i}-1)!} \left(\frac{\tau_{B_i}^{\omega_i}}{n_{C_i}} + \frac{\tau_{A_i}^{\omega_i}}{(n-n_{C_i})}\right)$$

Now, to characterize the equilibrium, we consider the difference in payoff between actions A_i and B_i. For the sake of brevity, we drop the conditioning on σ, and we have:

$$G(A_i|t_{A_i}, s_i, P_i, \mu_i) = \mu(a_i, \omega_j, \omega_k|t_{A_i}, s_i) \cdot U(A_i|t_{A_i}) \cdot P^{a_i}_{t_{A_iC_i}} + \mu(b_i, \omega_j, \omega_k|t_{A_i}, s_i) \cdot U(A_i|t_{A_i}) \cdot P^{b_i}_{t_{A_iC_i}}$$

and

$$G(B_i|t_{A_i}, s_i, P_i, \mu_i) = \mu(a_i, \omega_j, \omega_k|t_{A_i}, s_i) \cdot U(A_i|t_{A_i}) \cdot P^{a_i}_{t_{B_iC_i}} + \mu(b_i, \omega_j, \omega_k|t_{A_i}, s_i) \cdot U(A_i|t_{A_i}) \cdot P^{b_i}_{t_{B_iC_i}}$$

Therefore,

$$\begin{aligned} G(A_i \mid t_{A_i}, s_i, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_i, P_i, \mu_i) = {} & \mu(a_i, \omega_j, \omega_k \mid t_{A_i}, s_i) \cdot U(A_i \mid t_{A_i}) \cdot \left(P^{a_i}_{t_{A_iC_i}} - P^{a_i}_{t_{B_iC_i}}\right) \\ & + \mu(a_i, \omega_j, \omega_k \mid t_{A_i}, s_i) \cdot U(A_i \mid t_{A_i}) \cdot \left(P^{b_i}_{t_{A_iC_i}} - P^{b_i}_{t_{B_iC_i}}\right) \end{aligned} \tag{7}$$

Likewise,

$$
\begin{aligned}
G(A_i \mid t_{B_i}, s_i, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_i, P_i, \mu_i) = \mu(b_i, \omega_j, \omega_k \mid t_{B_i}, s_i) \cdot U(B_i \mid t_{B_i}) \cdot \left(P^{a_i}_{t_{A_i C_i}} - P^{a_i}_{t_{B_i C_i}}\right) \\
+ \mu(b_i, \omega_j, \omega_k \mid t_{B_i}, s_i) \cdot U(B_i \mid t_{B_i}) \cdot \left(P^{b_i}_{t_{A_i C_i}} - P^{b_i}_{t_{B_i C_i}}\right)
\end{aligned} \tag{8}
$$

Since we have assumed that the utility of voting for C_i = 0 for every $t_{A_i}, t_{B_i} \in P_i$ and it is equal to V>0 for t_{A_i} (resp., t_{B_i}) if $P_i = A_i$, (resp., $P_i = B_i$) and $v \in (0, V)$ vice versa for t_{A_i} (resp., t_{B_i}) if $P_i = B_i$, (resp., $P_i = A_i$), it is straightforward that Equation (7) $\geq$ Equation (8).

A.2 Proof of Proposition 1

Proposition 1. *Duverger's law equilibria exist and are expectationally stable under both Partially informative signal and Uninformative signal.*

Proof. Consider a voter i who has to cast a ballot, and hence define the voting strategy σ_i under Partially informative signal. This implies that $s_{\omega_i} = s_{a_i}$, while $s_{\omega_j} = s_{\omega_k} = s_0$. Then, $p_{A_i C_i} > p_{B_i C_i}$.

Thus, for a type t_{A_i} voter, from Equation (7), we have:

$$G(A_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) > 0$$

Likewise, for a type t_{B_i} voter, from Equation (8), we have:

$$G(A_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) > 0$$

Hence, Duverger's law is an equilibrium strategy under the Partially informative signal, with its expectational stability derived from the fact that this equilibrium is strict, as explained in Lemma 1.

Now, consider that the same voter i has to cast a ballot, and hence define the voting strategy σ_i, under the Uninformative signal. This implies $s_{\omega_i} = s_{\omega_j} = s_{\omega_k} = s_0$. Then, $p_{A_i C_i} > p_{B_i C_i}$. Assuming, for example, the case in which $\sigma_{t_{a_i}, s_0, P_i, \mu_i}(A) = 1$ and $\sigma_{t_{b_i}, s_0, P_i, \mu_i}(B) = \varepsilon$.

Then, for a type t_{A_i} voter, from Equation (7), we have:

$$G(A_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) > 0$$

Likewise, for a type t_{B_i} voter, from Equation (8), we have:

$$G(A_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) > 0$$

Duverger's law is thus an equilibrium strategy under Uninformative signal, with its expectational stability derived from the fact that this equilibrium is strict.

A.3 Proof of Proposition 2

Proposition 2. *If Sincere voting equilibrium exists and is expectationally stable under single-stage intra-positional election with $s_{\omega_i} = \{s_{a_i}, s_{b_i}\}$, then it also exists and remains expectationally stable when a second stage of inter-positional election is introduced. Then, under the Partially informative signal sincere voting* *equilibrium exists and is expectationally stable.*

Proof. Considering Proposition 2, and the corresponding proof, in Bouton et al. (2017) (Page 145, Section A.2.) for the Sincere voting equilibrium and its stability under single-stage intra-positional election, we know that when $s_{\omega_i} = \{s_{a_i}, s_{b_i}\}$, Sincere voting equilibrium exists and is expectational stable if and only if for $s_{\omega_i} = s_{a_i}$, then:

$$G(A_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) \geq 0 \tag{9}$$

and

$$G(A_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) \leq 0 \tag{10}$$

with $\mu_i = \beta_i(\omega_i|t_i, s_i)$.

When we introduce a second stage of inter-positional election, where $s_{\omega_i} = s_{a_i}$ whereas $s_{\omega_j} = s_{\omega_k} = s_0$, we reproduce the scenario of Partial uninformative signal.

Under this scenario, the belief is updated, based on the information coming from the two stage-election, and becomes $\mu_i = \beta_i(\omega_i|t_i, s_i) + \eta_j(\omega_j|t_i, s_{\omega_j}) + \eta_k(\omega_k|t_i, s_{\omega_k})$

Now, if conditions (9) and (10) are satisfied $\forall \omega_i = \{a_i, b_i\}$, then regardless of the state of nature occurring in j and k, we can claim that:

$$G(A_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) \geq 0$$

and

$$G(A_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) \leq 0$$

Therefore, a Sincere voting equilibrium exists and is expectational stable under Partially informative signal.

A.4 Proof of Proposition 3

Proposition 3. *If Sincere voting equilibrium exists under Partially informative signal, then it also exists under Uninformative signal.*

Proof. A Sincere voting equilibrium exists under Partially informative signal if and only if:

$$G(A_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_{a_i}, P_i, \mu_i) \geq 0 \geq G(A_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_{a_i}, P_i, \mu_i) \tag{11}$$

Under Uninformative signal, we know that:

$$\begin{aligned} G(A_i \mid t_i, s_0, P_i, \mu_i) - G(B_i \mid t_i, s_0, P_i, \mu_i) \equiv\ & \mu(a_i, \omega_j, \omega_k \mid t_i, s_{a_i}) \left[G(A_i \mid t_i, s_{a_i}, P_i, \mu_i) - G(B_i \mid t_i, s_{a_i}, P_i, \mu_i) \right] \\ & + \mu(b_i, \omega_j, \omega_k \mid t_i, s_{b_i}) \left[G(A_i \mid t_i, s_{b_i}, P_i, \mu_i) - G(B_i \mid t_i, s_{b_i}, P_i, \mu_i) \right] \end{aligned}$$

Then, for $s_{\omega_i} = s_{\omega_j} = s_{\omega_k} = s_0$, if condition (11) is satisfied $\forall \omega \in \Omega$, we have that:

$$G(A_i \mid t_{A_i}, s_0, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_0, P_i, \mu_i) \geq 0 \geq G(A_i \mid t_{B_i}, s_0, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_0, P_i, \mu_i) \tag{12}$$

Therefore, Sincere voting is an equilibrium strategy under Uninformative signal and, following Lemma 1, is expectationally stable.

A.5 Proof of Proposition 4

Proposition 4. *As long as the information decreases, the degree of ambiguity increases. Then, a sincere voting equilibrium exists and is the most likely to be selected.*

Proof. Let s_ω be the degree of informativeness of all public signal, i.e., $s_\omega = s_{\omega_i} + s_{\omega_j} + s_{\omega_k}$, then:

- For a type t_{A_i} voter

$$\lim_{(s_{\omega_i})\to 0} \left[G(A_i \mid t_{A_i}, s_\omega, P_i, \mu_i) - G(B_i \mid t_{A_i}, s_\omega, P_i, \mu_i)\right] \geq 0$$

- For a type t_{B_i} voter

$$\lim_{(s_{\omega_i})\to 0} \left[G(A_i \mid t_{B_i}, s_\omega, P_i, \mu_i) - G(B_i \mid t_{B_i}, s_\omega, P_i, \mu_i)\right] \leq 0$$

Therefore, as the informativeness of the public signal vanishes ($s_{\omega_i} \to 0$), each voter aligns with their most-preferred candidate, implying that a sincere voting equilibrium emerges and becomes the most likely outcome.

B. Appendix B - Additional analyses

B.1 Distribution of participants per treatment and country

TABLE B1. Distribution of participants per treatment and country

Treatment	Country	n° Sessions	n°Groups	n°Participants
NPA	Japan	2	5	30
	Italy	3	6	36
PA	Japan	2	4	24
	Italy	2	5	30
NPA+OA	Japan	2	5	30
	Italy	3	6	36
PA+OA	Japan	2	6	36
	Italy	3	6	36

B.2 NPA treatment: Aggregate and Individual behavior in each group

Vote distribution across a 60-round election under NPA treatment reveals that the only highly chosen alternative is jar, which accounts for 88.30% of cases. This action is chosen in 95.72% of cases within the Japanese subsample (with homogeneity across groups)[28] and in 80.88% of cases in the Italian ones (but with heterogeneity across groups).[29] This frequency is still compatible with a higher sincere voting attitude (approximately 69%), which is explained by the fact that approximately two-thirds of participants received a ball that matched the color of the selected jar. In fact, when the jar's color does not match the color of the ball assigned to the voter, the propensity for sincere voting drops significantly. In the Japanese subsample, the overall frequency of votes for the jar decreases to 88.60%, and the frequency of sincere voting declines to 10.72%. Similarly, in the Italian subsample, the frequency of voting for the jar decreases by approximately 16 percentage points, and the frequency of sincere voting is halved. A direct comparison of voting behavior when the ball color matches the jar versus when it does not reveals a statistically significant difference (Wilcoxon-Mann-Whitney test, $z = 3.142$, $p < 0.001$). This result highlights that participants are significantly more likely to vote for the jar when the ball color matches, as the alignment simplifies decision-making, whereas mismatches reduce sincere voting by introducing complexity.

Now, we give more consistency to the analysis by only focusing on the rounds in which voters have assumed one of the seven admissible strategies. In Table B2, we disaggregate the identified strategies for NPA treatment shown in Table 3 by independent groups. We observe that the percentage of identified strategies reaches almost 100% in most groups. The diversification of these strategies is minimal in Italy and nonexistent in Japan. These findings bolster the emergence of a prevalent type of equilibria under the certainty of the preference distribution of the group of voters, i.e., Duverger's law Equilibria, where participants strategically vote *Jar* or *Red*.

For the individual level, in the six Italian groups, 11.11% of participants vote for *Jar* in every round, while approximately 33.33% use this strategy in at least 90% of the rounds. Interestingly, 11.11% of Italian participants choose *Sincere* as their modal strategy. In contrast, the six Japanese groups exhibit a stronger

[28] The frequencies are 94.72%, 97.50%, 95.83%, 93.05%, 98.33% and 96.38% from group 1 to group 6.
[29] The frequencies are 61.39%, 57.78%, 93.61%, 85%, 91.39% and 96.11% from group 1 to group 6.

TABLE B2. Frequencies of identified strategies in each matching group of NPA treatment

Group		Strategy							% of identified strategies
		Blue	Red	Gray	Sincere	Opposite Sincere	Jar	Opposite Jar	
Italy	1	0.00	**80.64**	0.00	18.21	0.00	1.15	0.00	96.11
	2	0.00	**73.72**	0.00	20.82	0.68	4.78	0.68	81.39
	3	0.00	0.30	0.00	5.44	0.00	**94.26**	0.00	91.94
	4	0.00	0.00	0.00	30.03	0.64	**69.33**	0.00	86.94
	5	0.00	0.00	0.00	5.40	0.00	**94.60**	0.00	87.50
	6	0.00	0.00	0.00	18.77	0.00	**81.23**	0.00	99.17
Japan	1	0.00	0.00	0.00	16.67	0.00	**83.33**	0.00	100
	2	0.00	0.00	0.00	3.34	0.00	**96.66**	0.00	99.72
	3	0.28	0.00	0.00	6.53	0.00	**93.18**	0.00	97.78
	4	0.00	0.00	0.00	24.09	0.00	**75.91**	0.00	99.16
	5	0.00	0.00	0.00	0.28	0.00	**99.72**	0.00	97.78
	6	0.28	0.57	0.00	1.99	0.00	**97.16**	0.00	97.78

Note: Table B2 reports the average frequency of each strategy employed within the set of identified strategies for each voter group under the NPA treatment. In bold is the modal strategy for each group.

tendency toward Duverger's law equilibrium of voting for *Jar*: 58.33% of Japanese participants consistently vote for *Jar* in all 60 rounds, and 22.22% adopt this strategy in at least 90% of the rounds. Only 8.33% of Japanese participants use this strategy in fewer than 30 rounds, highlighting their greater alignment with strategic behavior compared to the Italian participants.

B.3 PA treatment: Aggregate and Individual behavior in each group

Vote distribution across a 60-round election under PA treatment reveals that the highly chosen alternative is to cast a ballot for the color associated with their ball, which accounts for 70% of the time, without differences between Italian and Japanese.

Subsequently, when we filter for the rounds in which voters adopted one of the five possible strategies, the tendency to vote sincerely becomes even more pronounced. In Table B3, we disaggregate the identified strategies for the PA treatment shown in Table 3 by independent groups. We observe that sincere voting, though not unique, is the most frequently played strategy. In fact, the modal choice is to vote *Sincere* in 5 out of 9 groups (3 Italian and 2 Japanese). *Blue* is the modal strategy for group 5 of Italy and groups 1 and 2 of Japan, while *Red* is the modal strategy only for group 2 of Italy. *Gray* and *Opposite Sincere*, as expected, are never modal. These results confirm the findings of Bouton et al. (2017), highlighting the coexistence of both types of equilibrium: Sincere voting and Duverger's law.

The coexistence of these two types of equilibria becomes more evident when analyzing individual voting choices across 60 rounds. For the individual analysis, we notice that the *Sincere* strategy is consistently adopted by only 5.56% of Italian participants and 12.50% of Japanese participants in all rounds. However, 25% of participants in both subsamples chose this strategy in at least half of the rounds. In contrast, the *Blue* strategy shows notable differences. It is consistently played by 8.33% of Japanese participants in all 60 rounds and by 41.66% in at least half of the rounds. In the Italian groups, only 8.33% of participants adopt this strategy for at least 20 rounds. The *Red* strategy is less prominent. It is played for at least 20 rounds by 8.33% of Italian participants, while only one Japanese participant employs it, and even then, for no more than 10 rounds. Finally, the *Opposite Sincere* strategy is adopted by only 2.78% of Italian participants, with no significant uptake among Japanese participants.

TABLE B3. Frequencies of identified strategies in each matching group of PA treatment.

Group		Strategy					% of identified strategies
		Blue	Red	Gray	Sincere	Opposite Sincere	
Italy	1	2.10	16.81	0.00	**81.09**	0.00	66.11
	2	14.63	**44.51**	0.00	37.19	3.65	45.55
	3	11.27	4.36	0.00	**57.45**	26.91	76.38
	4	4.39	2.93	0.00	**92.68**	0.00	56.94
	5	**53.53**	0.00	0.00	43.27	3.20	86.67
Japan	1	**90.36**	0.00	0.00	9.64	0.00	92.22
	2	**60.51**	0.00	0.00	39.49	0.00	97.78
	3	44.11	1.68	0.00	**50.51**	3.70	82.50
	4	9.48	0.00	0.00	**90.52**	0.00	90.83

Note: Table B3 reports the average frequency of each strategy employed within the set of identified strategies for each voter group under the PA treatment. In bold is the modal strategy for each group.

B.4 NPA+OA treatment: Aggregate and Individual behavior in each group

The strong convergency toward Duverger's law equilibrium – voting for the selected jar – observed at the aggregate level in Section 5.2.1 can be further elucidated by first disaggregating the data by groups and then analyzing individual behavior within each group.

When disaggregating the data by groups, as shown in Table B4, we show that the modal strategy is consistently *Jar* across all groups. This strategy accounts for no less than four-fifths of the overall identified strategies, with the sole exception of group 3 in the Italian subsample. Even in this case, no alternative strategy appears to be played with a higher frequency, reinforcing the notion that coordinating on the color indicated by the public signal (*Jar*) is the most effective approach for maximizing the expected utility of winning. Thus, under NPA-OA treatment, the equilibrium predicted by Duverger's law remains the only viable option. Moreover, as observed in the aggregate results (Table 4), all Italian groups tend to take more rounds to settle on a strategy, reflected in a lower percentage of *Identified strategies* compared to Japanese groups.

TABLE B4. Frequencies of identified strategies in each matching group in NPA+OA treatment

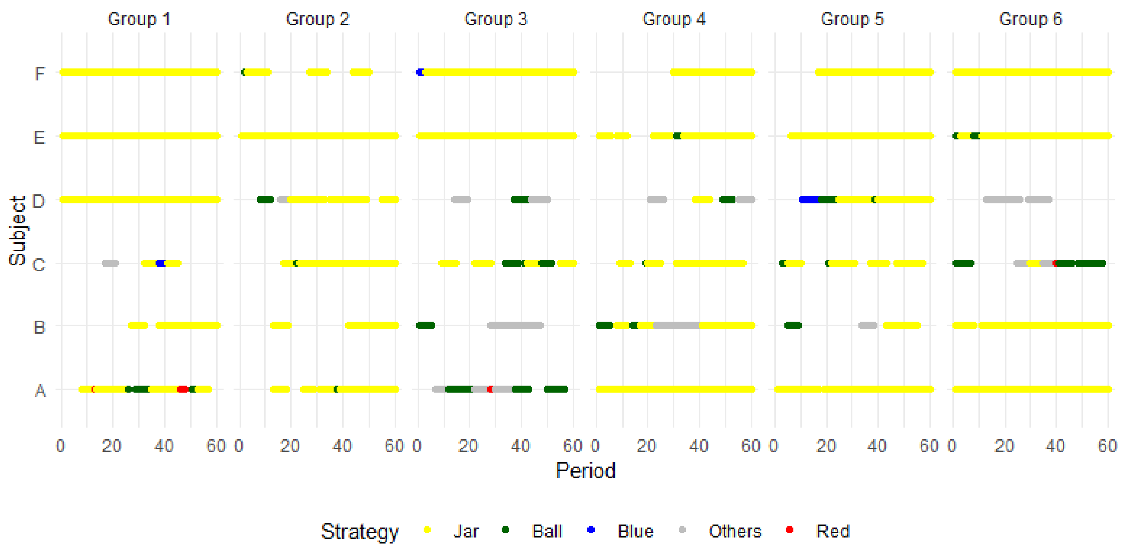
Group		Strategy							% of identified strategies
		Blue	Red	Gray	Sincere	Opposite Sincere	Jar	Opposite Jar	
Italy	1	1.09	1.46	0.00	3.28	1.82	**92.33**	0.00	76.11
	2	0.00	0.00	0.00	3.35	1.67	**94.98**	0.00	66.39
	3	0.81	0.00	0.00	19.35	6.85	**58.06**	14.11	68.89
	4	0.00	0.00	0.00	6.56	7.72	**82.24**	3.47	71.94
	5	2.62	0.00	0.00	5.99	0.00	**89.51**	1.87	74.17
	6	0.00	0.34	0.00	9.73	5.73	**79.19**	5.37	82.78
Japan	1	0.00	0.00	0.00	2.04	0.00	**97.96**	0.00	95.28
	2	0.00	0.00	0.00	2.92	0.97	**96.10**	0.00	85.56
	3	0.00	0.00	0.00	20.35	0.00	**79.65**	0.00	95.56
	4	0.00	0.00	0.00	0.84	0.00	**99.16**	0.00	99.44
	5	0.00	0.00	0.00	6.84	0.00	**93.15**	0.00	93.33

Note: Table B4 reports the average frequency of each strategy employed within the set of identified strategies for each voter group under the NPA+OA treatment. In bold is the modal strategy for each group.

These findings hold true when we analyze voting choices at the individual level. As shown in Figure B1, 19.44% of Italian participants and 43.33% of Japanese participants consistently employ the *Jar* strategy across all 60 rounds. Additionally, 25% of Italian participants and 20% of Japanese participants use this strategy in at least 50 rounds. Surprisingly, 11.11% of Italian participants never adopt the *Jar* strategy. This behavioral disparity could be associated to a significantly lower overall tendency to adopt any strategy type within the Italian subsample (73.38%) compared to the Japanese subsample (93.83%).

FIGURE B1
Individual behavior in groups in NPA+OA treatment

(a) Individual behavior in Italian groups



(b) Individual behavior in Japanese groups

B.5 PA+OA treatment: Aggregate and Individual behavior in each group

Further disaggregating the data from Table 6, first by groups and then by individual voters, reveals a clear convergence toward a Sincere voting strategy as ambiguity increases..

When examined at the group level, in Table B5, we observe that the *Sincere* strategy emerges as the modal choice across all groups, being employed in at least three-fourths of the overall identified strategies. The exceptions to this trend are group 3 of the Italian subsample and group 3 of the Japanese subsample, where a notable frequency of voting for Duverger's Law alternatives such as *Blue* or *Red* is observed. These deviations align with the assumptions of *Hypothesis 2*, which posits that outcome ambiguity amplifies the effect of preference ambiguity, encouraging a shift toward sincere voting. However, this behavior underscores that a sincere voting strategy, while predominant, does not constitute a universally unique equilibrium condition when preference distribution is not known. Additionally, as observed in all other cases involving at least one type of ambiguity, Italian groups take more time to settle on a strategy compared to their Japanese counterparts. This difference is further amplified when both types of ambiguity – preference and outcome – occur simultaneously.

TABLE B5. Frequencies of identified strategies in each matching group in PA+OA treatment

Group		Strategy					% of identified strategies
		Blue	Red	Gray	Sincere	Opposite Sincere	
Italy	1	5.32	4.73	0.00	**75.15**	14.79	46.94
	2	7.14	9.4	0.00	**81.58**	1.88	73.89
	3	42.86	2.23	0.00	**54.91**	0.00	62.22
	4	0.00	3.06	0.00	**96.94**	0.00	63.61
	5	15.50	2.50	0.00	**79.50**	2.50	55.56
	6	21.79	6.41	0.00	**71.79**	0.00	65.00
Japan	1	1.78	22.62	0.00	**75.60**	0.00	93.33
	2	0.61	22.08	0.00	**77.30**	0.00	90.55
	3	1.84	25.73	0.00	**66.18**	6.25	75.56
	4	0.00	0.00	0.00	**100**	0.00	97.50
	5	4.78	18.77	0.00	**74.06**	2.39	81.38

Note: Table B5 reports the average frequency of each strategy employed within the set of identified strategies for each voter group under the PA+OA treatment. In bold is the modal strategy for each group.

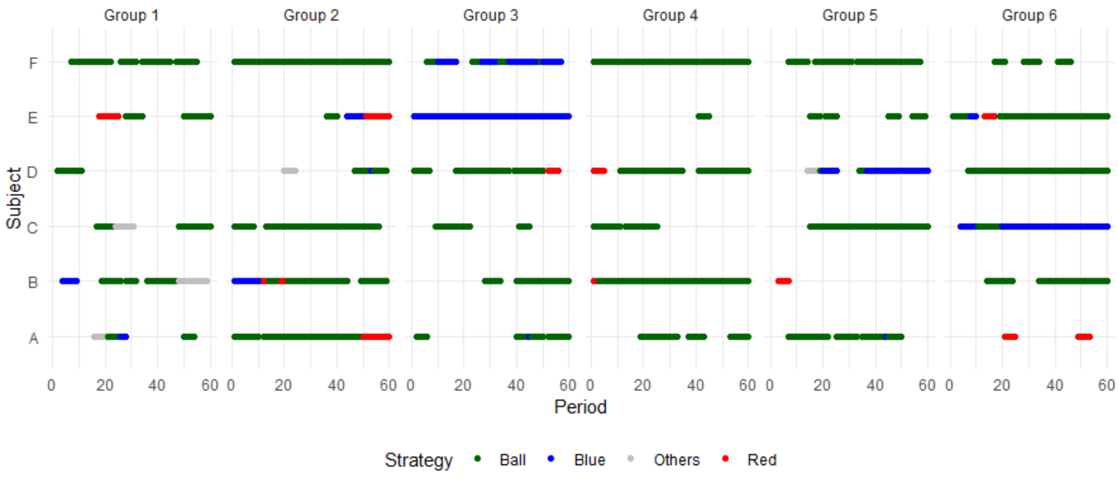
In Figure B2, examining voting choices at the individual level, we notice that the *Sincere* strategy is adopted in all 60 rounds by 30% of Japanese participants but only 5.56% of Italian ones. Nonetheless, more than one-fourth of participants in both subsamples employed this strategy for at least half of the rounds.[30] The alternative strategies, *Blue* and *Red*, are marginal compared to *Sincere*. For example, *Blue* is played in all rounds by only 2.77% of Italian voters and no Japanese voter adopt it for more than 10 consecutive rounds. Similarly, *Red* is used for up to 30 rounds by 13% of Japanese participants but for no more than 10 consecutive rounds by Italian voters.

[30]In the Italian subsample, fewer individuals consistently chose the *Sincere* strategy for the majority of rounds, reflecting a lower overall inclination to adopt any strategy consistently across all 60 rounds compared to the Japanese (61.20% vs. 87.66%). This difference is statistically significant (Wilcoxon-Mann-Whitney test, $z = 2.739$, $p = 0.004$), indicating a country-specific divergence in strategic behavior.

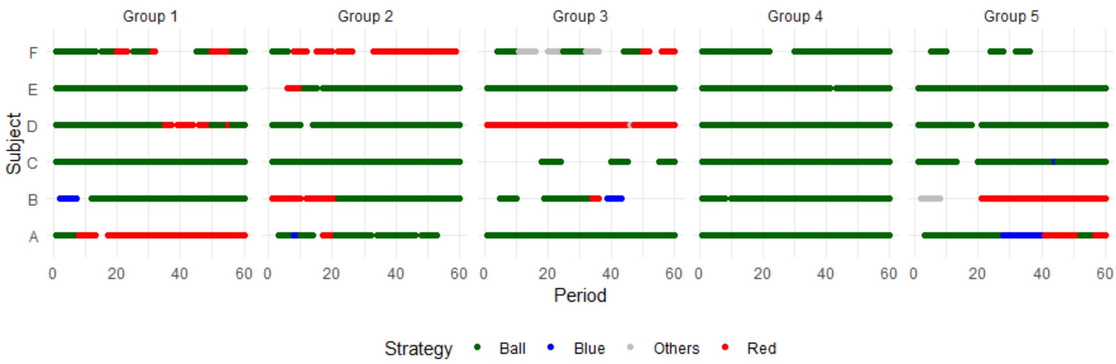
FIGURE B2

Individual behavior in groups in PA+OA treatment

(a) Individual behavior in Italian groups



(b) Individual behavior in Japanese groups



B.6 Summary statistics of socio-demographic charachteristics

TABLE B6. Summary statistics

	Full Sample		Japan	Italy	
	Mean	Std. Dev.	Mean	Mean	Difference
Age	21.178	2.052	20.192	22.036	1.844***
Female	0.360	0.481	0.342	0.377	0.035
Year of Education	2.748	1.474	2.242	3.188	0.947***
Economics	0.736	0.441	0.500	0.942	0.442***
Religion	1.655	0.804	1.358	1.913	0.555***
Politics	2.702	0.734	2.533	2.848	0.31***
Risk aversion	2.973	0.956	2.517	3.384	0.867***
Trust	2.302	1.022	2.150	2.420	0.270**

Note: *Age* is a continuous variable ranging from 18 to 60 years. *Female* is a dummy variable equal to 1 if the respondent is female. *Year of Education* is a discrete variable ranging from 1 (one year of education) to 9 (nine years of education). *Economics* is a dummy variable equal to 1 if the respondent is an Economics student. *Religion* and *Politics* are discrete variables ranging from 1 (not at all religious/not at all politically engaged) to 4 (extremely religious/extremely politically engaged). *Risk aversion* and *Trust* are discrete variables ranging from 1 (not at all risk-averse/do not trust people at all) to 5 (extremely risk-averse/extremely trusting).
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

C. Appendix C - Instructions

C.1 Instructions for NPA and PA treatments

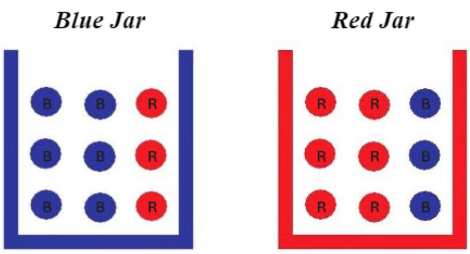
Welcome and thank you for taking part in this experiment. Please remain quiet and switch off your mobile phone. It is important that you do not talk to other participants during the entire experiment. Please read these instructions very carefully; the better you understand the instructions the more money you will be able to earn. If you have further questions after reading the instructions, please raise your hand. We will then approach you in order to answer your questions personally. Please do not ask aloud.

This experiment consists of 60 rounds. The rules are the same for all participants and for all rounds. At the beginning of the experiment, you will be randomly assigned to a group of 6 (including yourself). You will belong to the same group throughout the whole experiment. You will only interact with the participants in your group. Your earnings will depend partly on your decisions, partly on the decisions of the other participants in your group and partly on chance.

The Jar

There are two jars: the ***blue jar*** and the ***red jar***.

The ***blue jar*** contains ***6 blue balls*** and ***3 red balls***. The ***red jar*** contains ***3 blue balls*** and ***6 red balls***.



At the beginning of each round, one of the two jars will be randomly selected for your group. The color of the jar may thus change from one round to the next. In each round, each jar is equally likely to be selected, i.e., each jar is selected with a probability of 50%.

[*NPA treatment*] You will be told which jar has been chosen before making your decision.

[*PA treatment*] You will not be told which jar has been chosen before making your decision.

The Ball

After a jar is selected for your group, every participant in your group (including yourself) is going to see the color of ***one ball*** randomly drawn from that jar. Since you are 6 in your group, the computer performs this random draw 6 times, separately for each member. Each ball is equally likely to be drawn, and each draw is made with replacement. That is, independently of the balls received by the other members of the group, you and every other member of your group:

- have a chance of two thirds of receiving a blue ball if the selected jar is blue;

- have a chance of two thirds of receiving a red ball if the selected jar is red.

Importantly, ***you will only see the color of your own ball***, and not the color of the ball received by the other members of your group.

Your Decision

Once you have seen the color of one of the balls, you can make your decision. **You will have to vote for one of these three colors:** Blue, Red, or Gray. You can vote for one of the colors by clicking on it. After making your decision, please press the 'OK' key to confirm.

Group Decision

Once all participants have made their decision, the votes of all 6 participants will be added up. On top of that, the computer will add 4 votes for Gray. The group decision will depend on the total number of votes that each color receives:

- **If one color has strictly more votes than other colors,** this color will be the group decision.
- **If there is a tie between two colors with the most votes** (i.e., Blue and Gray, or Red and Gray), one of the two colors with the most votes will be selected randomly. Among the two colors with the most votes, each color will have the same probability of being chosen to be the group decision.

Payoff in Each Round

Your payoff depends on the ***color of your ball*** and on the ***group decision***. Your payoff is indicated in the following table:

		Group Decision		
		Blue	Red	Gray
Your Ball	Blue	200	110	20
	Red	110	200	20

The row (indicated on the left part of the table) specifies the color of your ball. The columns (indicated on the top part of the table) specify the group decision, i.e. which color got elected.

- If your ball is Blue and the group decision is Blue, you get 200 eurocents (resp., 400 yen).
- If your ball is Blue and the group decision is Red, you get 110 eurocents (resp., 220 yen).
- If your ball is Blue and the group decision is Gray, you get 20 eurocents (resp., 40 yen).
- If your ball is Red and the group decision is Blue, you get 110 eurocents (resp., 220 yen).
- If your ball is Red and the group decision is Red, you get 200 eurocents (resp., 400 yen).
- If your ball is Red and the group decision is Gray, you get 20 eurocents (resp., 40 yen).

To summarise, if the color of the group decision matches the color of your ball, your payoff is 400 yen (resp., 200 cents). If group decision is either Blue or Red, but does not match the color of your selected ball, your payoff is 220 yen (resp., 110 cents). Finally, if the color of the group decision is Gray, your payoff is 40 yen (resp., 20 cents) independently of the color of your ball.

Information at the End of Each Round

Once you and all the other participants have made and confirmed your choices, the round will be over. At the end of each round, you will receive the following information:

- Total number of votes for Blue
- Total number of votes for Red
- Total number of votes for Gray (including the 4 votes added by the computer)
- The *group decision* (which color got elected in your group: Blue, Red or Gray)
- The color of the selected jar (Blue or Red)
- Your ball (Blue or Red)
- Your payoff

Final Earnings

At the end of the experiment, the computer will randomly select 6 rounds and you will earn the payoffs you obtained in these rounds. Each of the 60 rounds has the same chance of being selected.

Control Questions

Before the experiment, you will have to answer some control questions in the computer terminal. Click on the OK button after you have answered each question. Once you and all the other participants have answered all the questions, the experiment will start.

C.2 Instructions for NPA+OA and PA+OA treatments

Welcome and thank you for taking part in this experiment. Please remain quiet and switch off your mobile phone. It is important that you do not talk to other participants during the entire experiment. Please read these instructions very carefully; the better you understand the instructions the more money you will be able to earn. If you have further questions after reading the instructions, please raise your hand. We will then approach you in order to answer your questions personally. Please do not ask aloud.

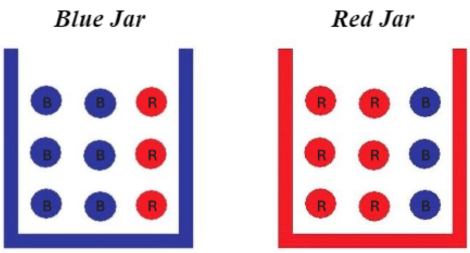
This experiment consists of 60 rounds. The rules are the same for all participants and for all rounds. At the beginning of the experiment, you will be randomly assigned to a group of 6 (including yourself). You will belong to the same group throughout the whole experiment. You will only interact with the participants in your group. Your earnings will depend partly on your decisions, partly on the decisions of the other participants in your group and partly on chance.

The Jar

There are two jars: the ***blue jar*** and the ***red jar***.

The ***blue jar*** contains ***6 blue balls*** and ***3 red balls***. The ***red jar*** contains ***3 blue balls*** and ***6 red balls***.

At the beginning of <u>each round</u>, one of the two jars will be randomly selected for your group. The color of the jar may thus change from one round to the next. In each round, each jar is equally likely to be selected, i.e., each jar is selected with a probability of 50%.



[*NPA+OA treatment*] You will be told which jar has been chosen before making your decision.

[*PA+OA treatment*] You will not be told which jar has been chosen before making your decision.

The Ball

After a jar is selected for your group, every participant in your group (including yourself) is going to see the color of ***one ball*** randomly drawn from that jar. Since you are 6 in your group, the computer performs this random draw 6 times, separately for each member. Each ball is equally likely to be drawn, and each draw is made with replacement. That is, independently of the balls received by the other members of the group, you and every other member of your group:

- have a chance of two thirds of receiving a blue ball if the selected jar is blue;
- have a chance of two thirds of receiving a red ball if the selected jar is red.

Importantly, ***you will only see the color of your own ball***, and not the color of the ball received by the other members of your group.

Your Decision

Once you have seen the color of one of the balls, you can make your decision. **You will have to vote for one of these three colors:** Blue, Red, or Gray. You can vote for one of the colors by clicking on it. After making your decision, please press the 'OK' key to confirm.

Group Decision

Once all participants have made their decision, the votes of all 6 participants will be added up. On top of that, the computer will add 4 votes for Gray. The group decision will depend on the total number of votes that each color receives:

- **If one color has strictly more votes than other colors,** this color will be the group decision.
- **If there is a tie between two colors with the most votes** (i.e., Blue and Gray, or Red and Gray), one of the two colors with the most votes will be selected randomly. Among the two colors with the most votes, each color will have the same probability of being chosen to be the group decision.

Payoff in Each Round

Your payoff depends on ***the color of your ball***, on the ***group decision***, and on a ***second draw***. The second draw consists in the following. Given the group decision, and whatever this decision, the computer inserts a ball with the color chosen by the group in an urn, together with a Green ball and a Black ball. Then, one of these three balls is randomly drawn:

- with probability 1/3, the drawn ball is the one with the color chosen by the group;
- with probability 1/3, the drawn ball is the Green one;
- with probability 1/3, the drawn ball is the Black one.

If the drawn ball is one with the color chosen by the group, then the group decision is applied. In the other two cases, the group decision is not applied, in the sense that the payoff of the 6 participants in the group does not depend on the group decision.

Depending upon this second drawn, your payoff is indicated in the following table:

		Group Decision Applied (probability = 1/3)			Group Decision NOT Applied	
		Blue	Red	Gray	Green (probability = 1/3)	Black (probability = 1/3)
Your Ball	Blue	200	110	20	5	15
	Red	110	200	20	15	5

The row (indicated on the left part of the table) specifies the color of your ball. The columns (indicated on the top part of the table) specify the group decision, i.e. which color got elected.

- If your ball is Blue and the outcome of the second draw is Blue, you get 200 eurocents (resp., 400 yen).
- If your ball is Blue and the outcome of the second draw is Red, you get 110 eurocents (resp., 220 yen).
- If your ball is Blue and the outcome of the second draw is Gray, you get 20 eurocents (resp., 40 yen).
- If your ball is Blue and the outcome of the second draw is Green, you get 5 eurocents (resp., 10 yen).
- If your ball is Blue and the outcome of the second draw is Black, you get 15 eurocents (resp., 30 yen).
- If your ball is Red and the outcome of the second draw is Blue, you get 110 eurocents (resp., 220 yen).
- If your ball is Red and the outcome of the second draw is Red, you get 200 eurocents (resp., 400 yen).
- If your ball is Red and the outcome of the second draw is Gray, you get 20 eurocents (resp., 40 yen).
- If your ball is Red and the outcome of the second draw is Green, you get 15 eurocents (resp., 30 yen).
- If your ball is Red and the outcome of the second draw is Black, you get 5 eurocents (resp., 10 yen).

To summarize:

- if the selected ball in the second draw is Green or Black, your payoff does not depend on your group decision, and is either 5 cents or 15 cents according to the color of your ball.

- if the selected ball in the second draw is the one with the color chosen by the group, then:

  - if the color of the group decision matches the color of your ball, your payoff is 400 yen (resp., 200 cents);

  - if group decision is either Blue or Red, but does not match the color of your selected ball, your payoff is 220 yen (resp., 110 cents);

  - if the color of the group decision is Gray, your payoff is 40 yen (resp., 20 cents) independently of the color of your ball.

Information at the End of Each Round

Once you and all the other participants have made and confirmed your choices, the round will be over. At the end of each round, you will receive the following information:

- Total number of votes for Blue
- Total number of votes for Red
- Total number of votes for Gray (including the 4 votes added by the computer)
- The *group decision* (which color got elected in your group: Blue, Red or Gray)
- The outcome of the *second draw* (Green, Black, or the color elected in your group)
- The color of the selected jar (Blue or Red)
- Your ball (Blue or Red)
- Your payoff

Final Earnings

At the end of the experiment, the computer will randomly select 6 rounds and you will earn the payoffs you obtained in these rounds. Each of the 60 rounds has the same chance of being selected.

Control Questions

Before the experiment, you will have to answer some control questions in the computer terminal. Click on the OK button after you have answered each question. Once you and all the other participants have answered all the questions, the experiment will start.