

Strategic Voting and Coordination Problems in Proportional Systems: An Experimental Study

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Strategic Voting and Coordination Problems in Proportional Systems: An Experimental Study¹

Abstract

We investigate strategic voting in proportional representation (PR) systems where parties are organized in pre-electoral coalitions and subject to a vote threshold. We show that such political systems are likely to generate coordination problems among the supporters of a coalition, and we examine voter behavior in this setting using a laboratory experiment with repeated rounds of elections. Our findings suggest that in absence of electoral history, voters cannot coordinate their efforts successfully and are more likely to vote sincerely. However, as history becomes available, the vote threshold induces strategic coordination on parties that performed best in previous elections.

Keywords

Strategic Voting, Coordination Games, Experimental Method, Proportional Systems, Thresholds

The once discounted idea that proportional representation (PR) triggers strategic voting has now become widely accepted in the discipline (see, for instance, Abramson et al. 2010; Bowler, Karp, and Donovan 2010; Hobolt and Karp 2010; Lago 2012; Viñuela and Artés 2012). Nonetheless, we argue that the mechanisms driving strategic voting under PR are not completely understood. This article focuses on one specific form of tactical voting—the strategic desertion of non-viable parties in the presence of a threshold—that we believe is fundamental in many PR systems. Our experimental design reproduces repeated rounds of PR elections with pre-electoral coalitions and a varying vote threshold, which allows us to examine the evolution of strategic behavior over time. Our findings help to understand the mechanism behind the occurrence and evolution of tactical voting in PR systems, which in turn leads to a rich set of implications for the study of party systems.

Specifically, we are interested in PR systems where party coalitions are formed before elections and where a vote threshold is required for a party to obtain seats. We consider instances in which voters have strict preferences over coalitions but disagree about which party should lead a given coalition (assuming that the party with the most votes within a winning coalition will lead the government). The idea that voters form preferences over coalitions has found strong support in recent empirical studies (see, for example, Blais et al. 2006; Bowler, Karp, and Donovan 2010; Duch, May, and Armstrong 2010; Gschwend 2007; Shikano, Herrmann, and Thurner 2009), justifying our decision to focus on this specific structure of preferences. We show below that in this context, the presence of a vote threshold leads to a coordination game between the supporters of a coalition—that is, voters from a specific camp have incentives to

coordinate their vote on viable parties to increase the chances that their preferred coalition forms the government. In fact, the problem becomes analogous to a familiar “Bach or Stravinsky” game.²

We should point out that our experimental design rules out other forms of strategic voting sometimes associated with PR systems. First, we impose the existence of predetermined coalitions, which means that our setup excludes the possibility of tactical coalition voting, that is, strategic voting aimed at influencing the formation of post-electoral government coalitions (Austen-Smith and Banks 1988; McCuen and Morton 2010). Second, our design is not suited to explore threshold insurance voting (or coalition insurance strategy), that is, voting strategically for a smaller member of a pre-electoral coalition at risk of not reaching the threshold (Cox 1997, 197–98; Fredén, forthcoming; Meffert and Gschwend, 2010). This form of strategic voting has been examined particularly in Germany where supporters of the major parties (the Christian Democratic Union (CDU) or the Social Democratic Party (SPD)) sometimes cast a list vote for the smaller coalition partner (the Free Democratic Party (FDP) or the Greens) to help that party reach the 5 percent vote threshold and, in the process, ensure that their preferred coalition obtain a majority of the seats and form the government (Gschwend 2004, 33). The type of strategic voting that we are studying here is sometimes called coalition-targeted Duvergerian voting (Bargsted and Kedar 2009; Hobolt and Karp 2010, 304), which simply means the strategic desertion of non-viable parties. This concept is close to familiar forms of strategic voting in plurality systems and should be the most intuitive to political scientists.³

Put simply, our argument is that supporters of party coalitions face a problem similar to that depicted in other games of coordination. Namely, many vote choices are strategically sound, although voters lack a reference point (or “focal point”) to coordinate their efforts successfully. This sort of problem has been the object of extensive research, in particular within the field of experimental game theory (see, for example, Blume and Gneezy 2000; Crawford and Haller 1990; Duffy and Hopkins 2005; Kim 1996; Mehta, Starmer, and Sugden 1994; Meyer et al. 1992; Van Huyck, Battalio, and Rankin 1997). To understand the strategic behavior of voters, we need to formulate hypotheses regarding the focal points that they will likely use to coordinate their actions.

To illustrate the problem in question, consider first the preference ordering of two supporters of a pre-electoral coalition composed of Parties A and B, as depicted in Table 1. This setup represents the case where there is no vote threshold.⁴ The numbers in the cells of Table 1 correspond to payoffs—the first numbers are the payoffs of Voter 1 given her own choice (row headers) and the corresponding choices of Voter 2 (column headers); the second numbers represent the payoffs of Voter 2. Those payoffs are useful to represent the ordering of preferences. Voter 1 prefers Party A within the A–B coalition, whereas Voter 2 prefers Party B. When their choices differ, both voters have an equal chance of seeing their preferred party lead the coalition, which they prefer to the outcome where their least preferred party ends up as the leader. This game has a single Nash equilibrium in which both voters choose their favorite party, which is the expectation of standard proximity models of voting.

Table 1. Voter Preferences without Threshold

		<i>Voter 2</i>	
		A	B
<i>Voter 1</i>	A	3, 1	2, 2
	B	2, 2	1, 3

In contrast, Table 2 depicts the situation in which voters have the same preference ordering, but where a legal threshold imposes that a party must obtain two votes to receive seats. In this case, both voters prefer to see their least preferred party lead the coalition than to see their favorite coalition receiving no seat at all. This structure corresponds to a simple Bach or Stravinsky game with two coordination equilibria: the two action profiles in which both voters choose the same party represent optimal strategies.

Table 2. Voter Preferences with Threshold of Two Votes

		<i>Voter 2</i>	
		A	B
<i>Voter 1</i>	A	3, 1	0, 0
	B	0, 0	1, 3

Empirical implementations of the problem depicted in Table 2 are challenging, because it is hardly possible to interpret and make sense of the choices made by voters. Failed or successful coordination is not informative of the motivations of voters, as both A and B are strategically sound choices for the two voters. Likewise, the voters' preferences are not informative of the observed outcome. Although it is possible to tell whether a voter casts a strategic vote (in the sense of a vote for the party that is not the first preference), without additional information we cannot understand the mechanism behind strategic voting.

For this reason, we devise laboratory experiments in which participants are asked to play the role of voters in *repeated* rounds of PR elections with a similar structure of incentives. By introducing a dynamic component, we are able to tell whether voters make use of the history of play—information about previous elections—to coordinate their efforts meaningfully. Moreover, an experimental setting allows us to manipulate and assign preferences randomly, hence avoiding endogeneity issues that could otherwise plague an analysis based on observational data. We also modify the size of the threshold to reduce the number of vote configurations that can lead to successful coordination. This research design leads to a rich set of results allowing us to shed light on the mechanisms behind strategic voting in PR systems.

Our specific objective is to test three predictions regarding the behavior of experimental subjects. Put simply, we are considering hypotheses about the focal points that players may consider when choosing among parties within their favorite coalition. In other words, we are interested in the behavioral aspects of equilibrium selection.

The first prediction is a key expectation stemming from the above-mentioned literature on experimental game theory, namely, that players use history as a focal point for coordination. That is, the observed outcome of the previous or initial round of play should serve as a reference orienting coordination efforts. We argue that the strongest party within a coalition in the previous rounds of play is likely to serve as a focal point for players preferring that coalition. The implication is that the distribution of votes should exhibit a pattern of path dependency. Stronger parties in the first round are expected to remain strong and to increase

their votes (when feasible), as players who supported the weaker parties are likely to rally behind the winner. Conversely, parties that did not perform well in the first round are expected to stay weak, or lose further support over time.

Our second prediction is also behavioral in nature. We argue that when faced with multiple options that are each associated with a sound strategy, players are likely to discriminate based on the choice that they sincerely prefer. Thus, the premise is that subjects are likely to exhibit a behavioral bias in favor of “sincerity.” Specifically, our hypothesis is that sincere preferences should predominate in the absence of any information about the history of play. A test of this prediction would consist of determining whether experimental subjects are more likely to vote sincerely in the first round of a series of elections. Combining this prediction with the previous one, we also expect that voters are more likely to coordinate their vote on the winner of previous rounds the closer this winner is to their sincere preference.

Our third prediction concerns the impact of the vote threshold. We predict that increasing the threshold should accentuate the tendency to vote strategically and rally around the viable parties. The rationale behind this prediction is that the threshold should reduce the probability that a sincerely preferred party reaches the threshold. In particular, we expect that a larger threshold will accentuate the tendency to coordinate on the winning party of the previous elections; in other words, we expect the threshold to act as a moderator of the impact of the history of play.

Experimental Research Design

We conducted a laboratory experiment simulating PR elections and for which college students were recruited from the university-wide subject pool including all academic divisions to play the role of voters. Our goal was to replicate the aforementioned structure of preferences with an extended number of voters. We used actual money rewards to reproduce theoretical payoffs, and we randomly assigned preferences over pre-existing coalitions and parties.

The experiment was programmed using the z-Tree software package (Fischbacher 2007) and conducted in the Social and Behavioural Lab at the TOBB University of Economics and Technology in Turkey. As the Turkish electoral system is characterized by PR elections with a large threshold (10%), we expected participants to easily understand the tasks given to them during the experiment. Before conducting the experiment, we pre-tested it during three experimental sessions and confirmed the reliability of our measures and of the experimental procedure.

We also took steps to verify that our findings based on a student sample can be generalized to a broader population. Druckman and Kam (2011) demonstrated that experimental results based on student samples will lead to valid inference as long as there is no variable with a different sample distribution interacting with the treatment effect. For the purpose of this study, we examined whether the level of political sophistication, arguably higher among students than in the general population, was related to strategic voting (and whether it interacted with

preferences to influence strategic voting). We found no significant relationship of that sort. This result is consistent with recent findings showing the absence of a clear relationship between information and the propensity to vote strategically (Blais and Gschwend 2011). Overall, we are confident that external validity is not undermined by the characteristics of our sample.⁵

Each experimental session included 18 participants and we conducted six sessions, for a total of 108 participants. Each session took approximately one hour to complete. Upon entering the lab, participants first completed the consent form about the study. Next, each participant was randomly seated in front of computer stations. Then, each participant filled out a questionnaire measuring variables such as political knowledge, personality dimensions, and political attitudes. This first section of the experiment took approximately fifteen minutes to complete.

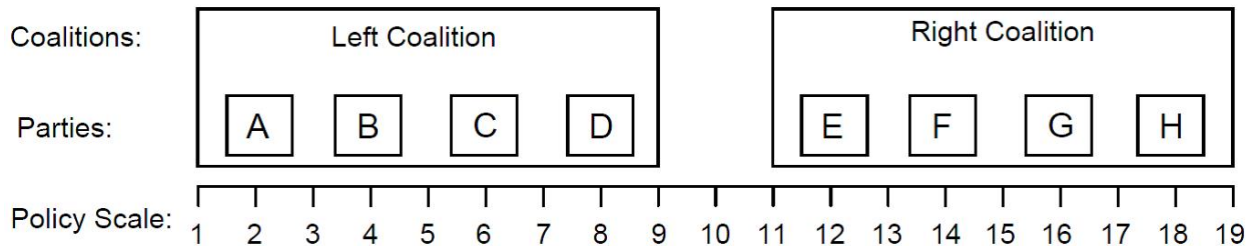
Next, the experimenter introduced the study to the group of participants. This second section comprised an introduction to the experiment, a trial session including a series of three elections, and a question-and-answer procedure to answer possible questions from the participants. This section took approximately ten minutes to complete.

Finally, the participants started the experimental procedure (discussed in greater detail below) including six series of three elections, eighteen in total. This final section took approximately forty minutes to complete. After everyone completed the study, they received a debrief form about the experiment and received their payment based on the points they gained in the study.

Experimental Procedure

Our six experimental sessions included eighteen participants who were randomly assigned to one of the two pre-electoral coalitions, each of which being composed of four parties. To represent preferences and payoffs, we introduced subjects with a hypothetical policy scale ranging from 1 to 19, illustrated in Figure 1. Parties forming the “left-wing” coalition were named A, B, C, and D and were associated with equally spaced positions on the left side of the policy scale at 2, 4, 6, and 8, respectively. Similarly, parties forming the “right-wing” coalition were named E, F, G, and H, and were given symmetrical positions on the other side of the scale at 12, 14, 16, and 18, respectively.

Figure 1. Policy Scale and Party Positions



Each participant was randomly given a position on the policy scale, from 1 to 9 if assigned to the left coalition, or from 11 to 19 if assigned to the right coalition. The positions were uniformly distributed, in the sense that one voter was associated with each position (except for the middle position 10, which was never assigned). We asked participants to vote for a party in three consecutive elections in a given series. The political position of the participant did not change for the three elections within a series. There were six series of three elections, and in every series, participants randomly received a new political position.

The voting procedure was as follows. Each vote delivered one seat to a party provided that party reached a given threshold. A party needed at least three votes to get a seat in the first nine elections; the threshold was four votes in the last nine elections. The camp (left or right) with the most seats formed the government. Within the winning camp, the party with the most seats became the leader of the government. Ties were broken randomly.

Each election included two computer screens. On the first screen, participants received information about their political position and were asked to make a vote choice. On the second screen, the participants were informed about the election outcome (the number of votes and seats for each party, the winning party, and the points received for this election). An online appendix shows captures of those two main screens. The experimenter reminded participants about the basic rules at the end of the third series of elections, when the vote threshold was increased from three to four.

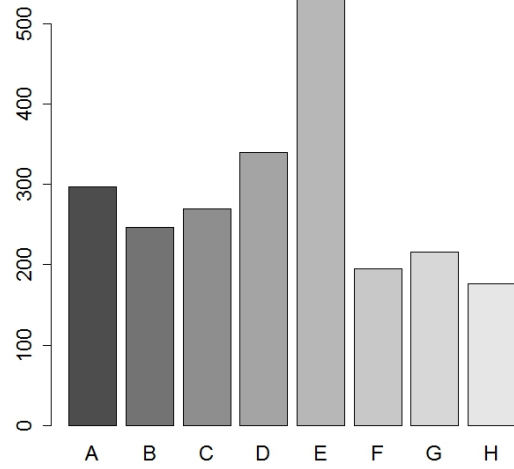
The payoff structure was as follows. Participants in the winning camp received five points. The losers did not get any points. Participants in the winning camp got an additional five points minus the distance between their position and the position of the party leading the government. If the distance was five or more, no additional points were given.

This payoff structure corresponds to a multi-player extension of the problem introduced in the previous section. There was an incentive for individuals to vote for the party closest to their own position. At the same time, given the uniform distribution of preferences along the policy

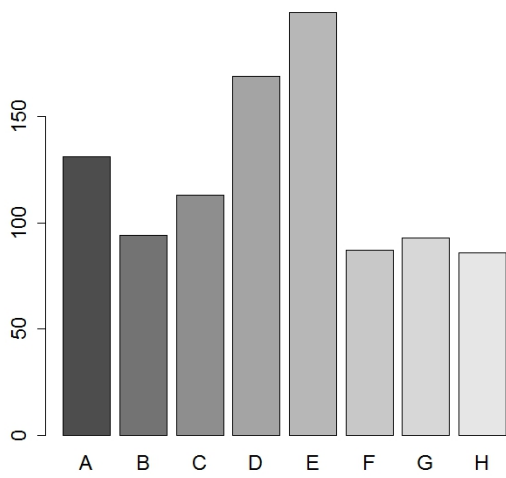
scale, participants could not expect parties to reach the threshold if everyone voted sincerely. In fact, when increasing the threshold to four votes, a possible electoral outcome was the coalition not gaining any seat at all. Therefore, participants needed to coordinate to be in the winning camp and maximize their payoff. Those who voted for a party that did not reach the vote threshold wasted their vote.

Figure 2a shows the overall distribution of votes across the six experiments. Figures 2b and 2c compare the distributions conditional on the size of the threshold. As can be seen, one of the parties (Party E) appears to have served most frequently as the locus of coordination among those subjects assigned to the right coalition, by receiving more votes overall. In the left coalition, coordination seems to have been oriented toward both Parties A and D, at least when the threshold was set to three votes (see Figure 2b).

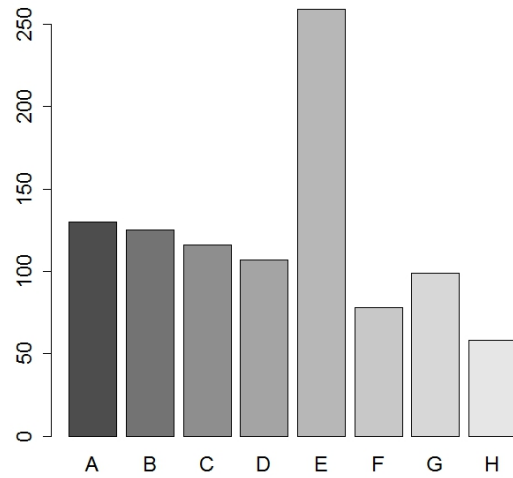
Figure 2. Distribution of Votes, Overall and by Threshold



a) All experimental sessions



b) Threshold: 3 Votes



c) Threshold: 4 Votes

Empirical Results

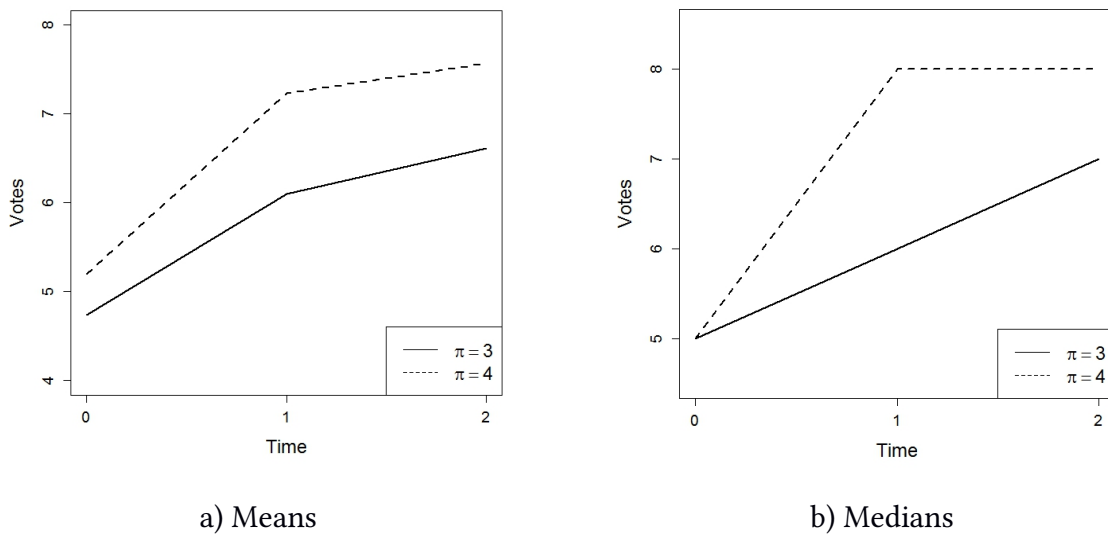
We begin our analysis by studying party-level results to verify the predicted patterns of voting behavior. Namely, our goal is to find out whether parties that performed best in initial rounds of play tend to benefit from strategic voting, and whether increasing the threshold affects this pattern (our first and third predictions, respectively). Later on, we will shift our attention to individuals to understand how voters solve the coordination problem.

Our first prediction is that a party with a plurality of votes in the first round (within a given coalition) is likely to serve as a focal point for coordination and to increase its number of votes in subsequent rounds. Figures 3 and 4 plot the average and median number of votes received by parties that ended up first inside their coalition in the first round. Figure 3 illustrates the evolution of votes within each series of three rounds—during which players keep the same preferences—for the two different values of the threshold (we will label the threshold π for short). Figure 4 follows the evolution of votes for the winning party during nine rounds (three series of three rounds).

Considering Figure 3 to start with, our first prediction appears substantiated by the aggregate data. The parties having received the (strictly) largest number of votes in the first rounds tend to get additional votes in the next two rounds. This is true irrespective of the value of the threshold. The pattern is slightly more complicated in Figure 4. When $\pi = 3$ (straight lines), the party ending up first in the beginning round appears to serve as a focal point within the

first three-round series but to lose support after the first reshuffling of preferences among participants. When $\pi = 4$ (dashed lines), a dominant party in the first round appears to remain so throughout the entire nine-round history.

Figure 3. Evolution of Votes for the Dominant Party in the Initial Round (Three-Round Histories)

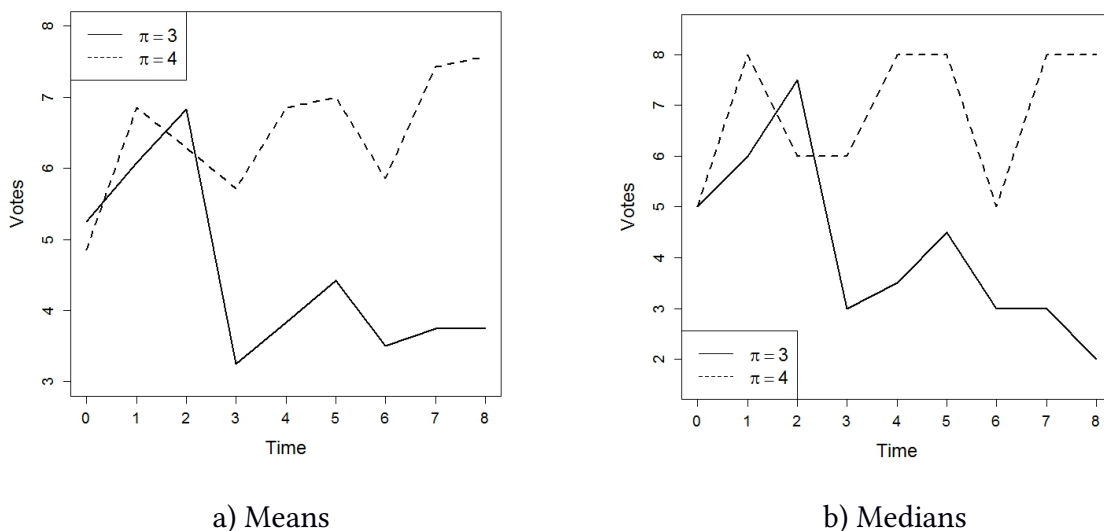


Both figures bring some support to the idea that the history of play interacts with the value of the threshold. The absolute change in the number of votes received by the leading party in the beginning round is greater (after three rounds) for the case $\pi = 4$ than with $\pi = 3$ (Figure 3), and this effect appears to last longer when $\pi = 4$ than with $\pi = 3$ (Figure 4).

However, we find it most relevant to consider three-round rather than nine-round histories. It is apparent from Figure 4 that the time-series break after each series of three rounds, when we

reallocate political positions among our experimental participants. For this reason and for simplicity of presentation, we focus on three-period histories in what follows.

Figure 4. Evolution of Votes for the Dominant Party in the Initial Round (Nine-Round Histories).



Note: Allocation of preferences randomly reshuffled after each three-round series.

To assess the patterns observed in Figure 3 more systematically, we consider additional statistical tests. Our eight parties represent units of analysis observed over 108 periods (for a total of 864 observations). The dependent variable is the number of votes that a party obtains in a given round. We name our explanatory variables Time (an integer measure of time periods within each three-round series, ranging from 0 to 2), Threshold (recoded as a binary variable equaling 0 if $\pi = 3$ and 1 if $\pi = 4$), and Winner (a binary variable equaling one if the party obtained a number of votes strictly greater than all other parties within a coalition in the first time period of a series, and zero otherwise).

To test our first and third predictions about the history of play and the vote threshold, our specification requires the inclusion of two-way and three-way interaction terms between the main covariates. For instance, testing whether the strongest party at Time = 0 increases its share of votes over time due to strategic considerations requires an interaction term (Time × Winner) where Time acts as a moderator. Thus, our party-level model has the following general form:

$$E(\text{Votes}) = f[a + b_1 \text{Time} + b_2 \text{Winner} + b_3 \text{Threshold} + b_4 (\text{Winner} \times \text{Threshold}) + b_5 (\text{Time} \times \text{Threshold}) + b_6 (\text{Time} \times \text{Winner}) + b_7 (\text{Time} \times \text{Threshold} \times \text{Winner})]$$

where $E(\text{Votes})$ is the expected number of votes obtained by a party.

Our first prediction implies that $b_6 > 0$ (i.e., for $\text{Time} \geq 1$, the party with the highest share of votes at the beginning of a series obtains more votes over time) and $b_1 < 0$ (parties that did not win in the first round lose support over time). Notice that the intercept a represents the average number of votes received by parties having not finished first at $\text{Time} = 0$, whereas $a + b_2$ is the average number of votes of the winning party at $\text{Time} = 0$ (trivially, b_2 should be larger than 0). Our third prediction is that $b_7 > 0$ (strategic coordination on the winner over time is exacerbated by an increase in the vote Threshold). We consider two different functional forms for f . For simplicity, we begin with a linear projection ($f[x] = x$) estimated by standard ordinary least squares (OLS), which has the most straightforward interpretation. However, as the dependent variable is a count, we also consider the more appropriate Poisson regression model ($f[x] = \exp[x]$).

The results are presented in Table 3. As can be seen, the hypothesis $b_6 > 0$ is confirmed by a t-test at the 99.9 percent confidence level for $\text{Time} \geq 1$. Focusing on the linear model, the expected number of votes of a party is 1.528 at time 0 (with a Threshold of three votes), compared to $1.528 + 3.354 = 4.882$ for the party that obtained the maximal number of votes in that initial period. Over time, parties that were not in the lead in the first period lose support on average, as indicated by the negative sign of the Time variable (b_1). In contrast, the party initially dominant gains even more votes, to the rate of 1.192 per period ($\text{Time} \times b_6$). Of course, the linear model does not produce consistent point estimates because the predicted number of votes may exceed the realistic maximal value of 9. However, as shown in the right section of the table, the implications are actually the same in the Poisson regression.

Table 3. History of Play as a Focal Point for Coordination (Party-Level)

DV: Number of Votes	Linear Regression			Poisson Regression		
	Estimate	Std. Err.	<i>p</i> -value	Estimate	Std. Err.	<i>p</i> -value
Time	-0.257	0.093	0.006	-0.203	0.060	0.001
Winner	3.354	0.259	0.000	1.161	0.101	0.000
Threshold	-0.129	0.170	0.447	-0.083	0.102	0.415
Winner x Threshold	0.731	0.369	0.048	0.201	0.143	0.162
Time x Threshold	-0.055	0.131	0.677	-0.087	0.088	0.323
Time x Winner	1.192	0.201	0.000	0.365	0.080	0.000
Time x Threshold x Winner	0.303	0.286	0.289	0.104	0.114	0.364
Intercept	1.528	0.120	0.000	0.430	0.071	0.000
N	864			864		
R^2	0.697 (Adjusted)			0.798 (Cragg-Uhler)		

Note: The dependent variable is the number of votes obtained by a party.

The third prediction, that increasing the threshold reinforces the tendency of players to coordinate on the strongest party at Time = 0, is not a robust finding. Although the estimate is positive for the three-way interaction term (0.303), it cannot be distinguished from 0 with reasonable confidence. There is a gap between the expected votes for the Winner under the two different thresholds (which corresponds to the estimate of $b_4 + b_7 = 1.03$, approximately one vote), but the tendency to coordinate on the Winner does not seem to increase significantly over time with the threshold.

Individual Mechanisms of Strategic Voting and Equilibrium Selection

We now turn our attention to individual behavior. Our new units of analysis are the experimental subjects by period. We begin by testing our second prediction, that is, whether voters facing a coordination problem exhibit a sincerity bias in the absence of information about history. Next, we investigate whether history leads to the strategic desertion of non-viable parties, and which individuals are more likely to rally behind the winner.

Our behavioral argument implies that, in the initial round of play, voters are more likely to choose based on their sincere preference, because there is no other focal point to select among viable strategic decisions. To assess this, Table 4 shows a cross-tabulation of sincere voting by time period within series of elections. Both variables are coded intuitively. The binary dependent variable, Sincere Voting, measures whether the subject casts a sincere or a strategic (non-sincere) vote. Once again, Time measures periods within each three-round series. Percentages are computed within the categories of Time, such that they can be compared easily across columns of the same row.

The distribution of sincere voting shown in Table 4 is largely consistent with the idea that, in the absence of history, voters are much more likely to vote for their sincere preference. Subjects voted sincerely roughly two-thirds of the time (66%) in the first period of a new assignment of preferences. This proportion reduces to about half (49%) in the second election and decreases further to 44 percent in the third one. Obviously, this finding can be read the other way around: subjects voted strategically in the first round only a third of the time, but this proportion increases to 56 percent in the third round.

Table 4. Cross-Tabulation of Sincere Voting by Three-Round Time Period

Sincere Voting	Time			Total
	First	Second	Third	
Sincere	429 66.20%	320 49.38%	286 44.14%	1,035 53.24%
Strategic	219 33.80%	328 50.62%	362 55.86%	909 46.76%
Total	648 100%	648 100%	648 100%	1,944 100%

$$\chi^2 = 69.19; p < 0.001.$$

The fact that some people cast a non-sincere vote in the first round can be explained by at least two factors. First, as explained before, no single choice is theoretically unsound, because coordination on any of the parties represents an equilibrium strategy. Thus, we may reasonably expect some strategic voting in the first round. Second, some subjects may also be confused at

the beginning of the experimental session and/or after the reshuffling of preferences. Put another way, some subjects may simply make mistakes in the initial round because of their unfamiliarity with the game. Both these types of non-sincere voting in the initial round produce random variation in the outcome, and it is this random variation that will eventually create winners. In other words, the random events happening in the initial round contribute to the apparition of focal points allowing voters to coordinate on the more viable alternatives.

Next, to confirm whether strategic voting manifests itself as a desertion of non-viable parties, we look at the association between the viability of one's sincerely preferred party in the previous round and strategic voting in the current round. Table 5 shows the relationship between those two binary variables. Notice that we consider the outcome of the sincerely preferred party at time $t - 1$ so that we lose 648 observations at the beginning of each three-round series across the six sessions (the initial 1,944 observations are reduced to 1,296).

Table 5. Cross-Tabulation of Strategic Voting by Lagged Viability of Sincerely Preferred Party

Sincere Voting	Score of Sincerely Preferred Party at $t - 1$		Total
	Viable ($\geq \pi$)	Non-Viable ($< \pi$)	
Sincere	246 89.45%	360 35.26%	606 46.76%
Strategic	29 10.55%	661 64.74%	690 53.24%
Total	275 100%	1,021 100%	1,296 100%

$$\chi^2 = 255.60; p < 0.001.$$

Focusing on the first row of Table 5, we observe a clear relationship between the prevalence of strategic voting and the performance of the preferred party in the previous round. Our participants kept voting sincerely nearly 90 percent of the time when their sincere preference passed the threshold in the previous election. This proportion drops to 35 percent if the sincerely preferred party did not make the threshold. Put the other way around, strategic voting arises first and foremost when the sincere preference performed badly in the previous round. This implies that non-viable parties lose further support as a result of tactical voting.

As a final step, we seek to answer the question raised by the party-level findings presented in Figure 3. We know that an important fraction of voters coordinate their vote on the winning party within their preferred coalition. The remaining question is to understand which voters are more or less likely to do so.

First, we note that individual-level data are consistent with the idea that strategic voters defect from their sincere preference in favor of the most viable party. Restricting our attention to strategic votes cast after a party had secured the clear plurality of votes in the previous round (which amounts to 625 of the 690 strategic votes reported in Table 5), 79 percent (491) were in favor of that winning party. Thus, only 21 percent of strategic votes were for a party that was not the clear winner.

Second, we address the same problem in a slightly different way by asking what makes someone switch their vote to rally behind winning parties, using multivariate analysis. Again,

our data are in panel format, with 108 subjects observed for eighteen periods. Our dependent variable is labeled “Winning Party” and it equals one if the subject casts a vote for the party that won the election in the previous round, and zero otherwise. We include a control variable called *Inertia* measuring whether the participant already voted for the party that happened to have won the most votes at $t - 1$, allowing us to concentrate on the probability to rally behind the winner. As we did in Table 5, we exclude the first period of each three-round series, because at this point there is no information on the history of play.⁶ Moreover, the definition of our dependent variable implies that we exclude the rounds in which there were no party with a strict maximum number of votes in the previous round (e.g., elections where two parties were tied for first place).

Consistently with our second and third predictions about the sincerity bias and the vote threshold, we consider binary logistic regression models with the following explanatory factors:

- *Distance*: The distance between the randomly assigned position of the participant on the policy scale and the position of the Winning Party from the previous round. More precisely, we consider the loss in payoff that a participant incurs for the victory of that party. This loss ranges from 0 to 5 (see previous section), but we normalize it within the $[0, 1]$ range, so that estimates can be easily compared in size with those from binary variables.
- *Sincere Lost*: A binary variable equaling one (zero otherwise) if the participant voted for their sincere first preference in the previous round and that party ended up below the threshold.

- *Threshold*: A dummy variable equaling one when the threshold is set at four votes and zero when the threshold is set at three. This variable captures the additional stimulus of a larger threshold, as stated in our third prediction.
- *Time Period*: A measure counting periods within three-round series. As we already account for the determinants of strategic voting, the Time variable should capture any residual “learning effect” explaining the decision to support the leader of the previous round.

Table 6 shows the results of binary logistic regressions including the variables just described. The first column shows a standard binary logit model. In the second column, we consider a fixed-effects logistic regression model in which each participant (of the 108 across the six experimental sessions) has their own intercept. This means that every possible factor specific to those participants is filtered out from the regression. The use of this statistical tool may appear redundant in an experimental context, because the preferences of subjects were randomized. However, a model with fixed effects reinforces the claim that the inferences we make are not contaminated by confounding factors specific to our subjects or external to the experiment.⁷

As can be seen, both versions of the model perform relatively well in explaining the decision to vote for the winning party of the previous round. Using the first model, we classify 79 percent of the cases correctly. The area under the receiver operating characteristic (ROC) curve reaches 0.82, and this value reaches 0.88 in the fixed-effects version of the model, suggesting a very good fit. The number of observations is 1,143; this number reduces to 907 in the fixed-effects model for the reason explained in Note 7.

Table 6. Logistic Regressions: Individual Determinants of the Coordination Vote for the Winning Party at $t - 1$

DV: Winning Party	Logistic Regression			Fixed-Effects Logistic Regression		
	Estimate	Std. Err.	<i>p</i> -value	Estimate	Std. Err.	<i>p</i> -value
Distance	-0.823	0.244	0.001	-1.413	0.316	0.000
Sincere Lost	0.712	0.201	0.000	0.825	0.281	0.003
Threshold	0.656	0.158	0.000	0.906	0.185	0.000
Time Period	-0.013	0.160	0.937	0.314	0.177	0.077
Inertia	2.665	0.205	0.000	2.230	0.256	0.000
Intercept	-0.298	0.456	0.513			
<i>N</i>	1,143			907		
% Correctly Classified	78.74%			81.26%		
Area under ROC Curve	0.82			0.88		

Notes: The dependent variable Winning Party measures whether the experiment's participant voted for the party with the strictly largest number of votes in the previous election (within the preferred coalition). The fixed-effects model excludes all participants who never (or always) voted for the winner across the election series, since their individual intercept becomes a perfect predictor.

The estimates reported in Table 6 substantiate most of our predictions. The distance between the ideal point of the participant and the position of the winning party in the previous round is a strong predictor of the decision to coordinate on the winning party. In other words, participants were more likely to use the focal point provided by the existence of a winning party when this party was close to their (randomly assigned) first preference. This result is consistent with our expectation that sincere preferences moderate the propensity to coordinate on the previous winner.

To depict this result, we compute the marginal effect of Distance while focusing on those voters who switched their vote to coordinate on the winning party, by setting the Inertia variable to zero. The predicted probability of rallying behind the winner reduces from .72 to .38 for a change from the minimal value of Distance (a sincere preference for the winner at $t - 1$) to the maximal value (the winner at $t - 1$ represents the least preferred option of a subject within the favorite coalition). We computed those predicted probabilities using estimates from the fixed-effects model, after setting the individual intercepts and Sincere Lost to zero and holding other variables at their sample means.

A related finding is useful to understand strategic coordination, namely, the viability of one's sincere preference. The second estimate reported in Table 6 (Sincere Lost) suggests that participants consider not only information about the winning party in the previous round but also information about how well their sincere preference performed. The positive estimate indicates that when a participant selects her first preference in the previous round and this party did not make the threshold, she is much more likely to switch and support the winner in the next round. The marginal effect (again using the fixed-effects model, setting Inertia to zero and holding other variables at their means) is +20 percentage points.

Finally, we observe that the threshold does have an effect in the multivariate model and that it appears to stimulate the tendency to coordinate on the winner from the previous round of play. The impact of a change in the threshold is moderate in magnitude (with a marginal effect similar in size to that of Sincere Lost). However, this result is not very robust. For instance, when adding a variable measuring the eighteen time periods within each experimental session,

the estimate for Threshold cannot be distinguished from zero anymore (results not shown), while the other findings remain.

Conclusion

This article has set out to examine the mechanisms of coordination and strategic voting in elections under proportionality rule with a vote threshold. We have considered the case in which voters have strict preferences over pre-electoral party coalitions and conflicting preferences over parties within those coalitions. We have shown that in the presence of a threshold this situation leads to a coordination game between the supporters of coalitions.

A key empirical question to address in this type of voting game is how voters behave when multiple decisions are viable. We proposed an explanatory framework in which voters make use of information provided by the history of play to achieve coordination. We have also argued that a strong behavioral factor interfering with individual decision making would be the tendency of experimental subjects to prefer sincerity. That is, we predicted that when many options lead to the same expected payoffs individuals exhibit a tendency to select the one closest to their sincere preference.

Specifically, we argued that in an election where no history is available, voters are more likely to choose according to their sincere preference, even though this outcome is theoretically unstable if all voters believe that other players will also vote sincerely. We predicted that as

history becomes available voters would coordinate on winning parties, especially when those parties are close to their sincere preference. Moreover, we predicted an increase in the vote threshold to stimulate coordination on the strongest parties.

We implemented a laboratory experiment reproducing repeated rounds of this type of elections, and in which preferences were randomly assigned. Our data bring strong support to our hypotheses. First, participants are more likely to vote sincerely at the beginning of a new round of elections. Second, coordination on the party that won the previous round occurs mostly when one's sincerely preferred party did not pass the threshold in the previous election, and the closer the winner of the previous round is to one's sincere preference. Overall, we find clear evidence of strategic voting under the form of a desertion of non-viable parties.

Those results raise a number of substantive implications for the study of elections and parties in proportional systems with thresholds. Our findings suggest that what happens during the infancy of a democracy (or following the apparition of a new party system) matters, inasmuch as voters rely upon available history to coordinate on viable options. Immediately after the implementation of PR systems, voters should tend to vote sincerely because they have little information available to coordinate their efforts. Parties that perform well in the first elections are likely to become focal points for future elections, leading to a phenomenon of path dependency in which strategic voting helps those parties to remain dominant. This implication is quite consistent with existing empirical evidence showing that the prevalence of strategic voting under PR increases over time in new democracies (see Lago 2012; Tavits and Annus 2006). Moreover, our findings suggest that coordination should help successful parties that,

policy-wise, are located closest to the sincere preferences of important shares of voters within the supporters of a coalition.

Another implication concerns the comparative study of electoral systems. Our research design emphasized a form of tactical voting in PR elections with thresholds—the strategic desertion of non-viable parties—that is very similar to what has been traditionally found in single-member plurality systems.⁸ Although we have found sincere preferences to remain a determinant of voter behavior, our study illustrates how the threshold barrier induces a strong strategic incentive for voters to rally around the viable parties. In other words, the threshold represents an instrument making PR systems more similar to plurality systems.

Finally, the results presented in this article raise interesting questions for future research. We chose to focus on history of play and its impact on strategic coordination because this relationship had not been stressed forcefully in the literature so far, despite its important implications for the study of elections. However, the reason why some voters decide to vote strategically when there is no clear focal point available—such as in the first election in our experiment or at the beginning of a new democracy or party system—remains an unresolved question. We have tested various factors but did not find a conclusive answer at this point. Future research could help to understand what happens during the initial stage of such equilibrium paths, by determining if the first occurrences of coordination are the result of purposeful choices made by some individuals, or else the product of purely random noise.

Notes

1. We thank Simon Labbé St-Vincent and Mehmet Yiğit Gürdal for their comments and support in earlier phases of the study, Emrah Gülsunar for his research assistance in data collection and the three reviewers for their helpful advice.
2. We use the nomenclature proposed in Osborne and Rubinstein (1994, 15-16).
3. Throughout this text, we adopt the convention of using the concepts of “strategic voting” and “tactical voting” interchangeably to mean the act of voting for a party that is not the sincere preference of a voter. A “sincere” preference means the party that a voter prefers regardless of the behavior of other voters or the expected electoral outcome. It shall be observed that a sincere vote may actually represent an optimal “strategy,” in the sense that this choice can represent the best response of a voter even after considering the behavior of others.
4. For completeness, we could have considered the presence of another coalition involving two different voters and parties. However, it is simpler to assume that supporters of the first coalition are seat-maximizers, such that modeling several coalitions simultaneously becomes redundant.
5. We should also point out that previous research in Turkey using convenience samples supports the view that empirical relationships observed in an experiment can be generalized to the population (Erisen 2013).
6. Recall that the preferences attributed to each subject are reshuffled after each three-round series. Our previous findings have shown that the impact of history occurs mostly within the three-round periods (see Figure 3).
7. The drawback of the fixed-effects model is that the individual intercepts for subjects who always or never selected the previous round’s leader during the experiment (i.e., with no variation in the outcome) become perfect predictors. Hence, those subjects cannot be included in the computation of the estimates of a binary logit model, and we lose these observations.
8. Note that most proportional representation (PR) systems do have a legal vote threshold (see Blais and Massicotte 2002, 51).

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