Majority Requirements and Minority Representation*

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Majority Requirements and Minority Representation

1. Introduction

Multi-candidate elections run under “Majority Requirements” may lead to two rounds of voting. In the first round (the “primary” round), voters cast votes for a single candidate. If one candidate receives a majority of votes, that candidate wins the election. If not, a subsequent “run-off” election is held between the two leading candidates from the primary election. The candidate who wins the runoff is elected. This two-round system stands in contrast to elections run under a “Plurality” system. Under the plurality system, the candidate with the most votes in a single election round wins, regardless of whether that candidate receives an absolute majority of votes.

The effect of majority requirements on the ability of minority voters to elect representatives of their choice in elections is controversial. On one hand, comparative electoral scholars following Duverger (1967) have long grouped majority requirements with proportional representation[1] as having the effect of increasing the number of voting groups who can achieve representation (such groups are know as “viable electoral coalitions”). It is argued that this benefits minority ethnic groups in particular since a candidate need only be second in vote totals to make a runoff election (assuming that no candidate receives the required majority in the first round). In his seminal work on the effects of electoral institutions on voter coordination, Cox (1997) argues that with majority requirements should lead to three viable electoral coalitions, while plurality voting should lead to only two.[2] Golder and Clark (2003) maintain that, as ethnic heterogeneity in presidential systems increases, the number of candidates for president also increases if majority requirements are used, but not under plurality rule. Similarly, some minority rights activists in American politics contend that runoff elections can help minority candidates win

[1] Proportional Representation is a system in which seats in representative bodies are awarded to parties in proportion to the votes they receive in the election, usually subject to some minimum vote requirement.
[2] For example, see Cox (1997) page 138.

elections where they would not be successful under plurality rule. For example Andrew Young became the first black mayor of Atlanta by winning a runoff election after placing second in the primary vote and he argued against changing the majority requirement rule in Georgia.

Yet, there are reasons to doubt the extent that majority requirements facilitate the ability of more than two major electoral coalitions, particularly those dominated by ethnic minorities, to win elections. It is generally believed that the motive for the adoption of majority requirements in the eleven southern states in the United States where they are currently used (Alabama, Arizona, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, and Texas) was to reduce the ability of African-American candidates to win elections as they gained the right to vote.[3] Many political activists such as Lani Guinier (1994) believe that majority vote requirements discriminate against minorities, adding an additional barrier to achieving office.[4] These minority rights activists typically point out instances in which minority

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[3] Kousser (1996) summarizes this view of the adoption of majority requirements in the south and the evidence in support: "Neither historians nor political scientists have specifically investigated the intent of the original framers of runoff requirements. There is likely to be little direct evidence about their purpose, since they were often adopted at non-public party executive committee meetings, and even in cases when they were written into law, the surviving evidence from state legislative records will probably not be conclusive. None of the southern state assemblies recorded debates or printed committee reports, newspaper stories on any but the most controversial amendments are usually uninformative, and few legislators left collections of their papers. There was lots of press discussion about the general principles of primaries and conventions, but little on such specific topics as the runoff. … The indirect evidence from the pattern of adoptions of the runoffs suggests that racial motives for choosing the device were hardly absent. South Carolina, which had the largest proportion of blacks of any state in 1900, was the first to put the statewide primary and the runoff into regular use. The Democratic convention which proposed the scheme in that state, in an action paralleled in Georgia in 1906, also called for state constitutional action to disfranchise blacks. Mississippi, which had the second largest percentage of blacks, became the first state to mandate the runoff primary by law, and Alabama acted by party rule in the same year. Florida, still over 40% black at the turn of the century, held its first runoff in 1904, and Louisiana, third in black proportion, acted by law in 1906. Texas toyed with the idea, Tennessee's runoff was born late and died in infancy, and North Carolina acted only in 1915. Among the eleven ex-Confederate states, only Arkansas in the Deep South and the border state of Virginia, its machine and anti-machine factions solidified early, never instituted the double primary during the first two decades of this century. No northern state, not even such uncompetitive ones as Maine, Vermont, and Kansas, ever experimented with runoff primaries. In sum, the evidence suggests that the primary in the South in general, and the runoff in particular, was not part of a general "progressive" movement to democratize elections, but rather, that it was one episode in a reactionary crusade to eliminate any chance of black influence in politics by perpetuating one-party rule."

[4] For example, in his presidential campaign of 1984, Jesse Jackson strongly criticized majority requirements and called for their elimination. Lani Guinier, who represented the plaintiffs in an unsuccessful court case challenging majority requirements in Phillips County, Arkansas, recounts her

candidates won primaries with a plurality of the vote in a three-way contest but later lost to a white candidate in the succeeding runoff.[5] Gerber and Morton (2003) show that, controlling for other factors that affect political competition, Congressional districts with majority requirements have fewer candidates than in other districts. This suggests that majority requirements repress the number of viable electoral coalitions.

The formal theoretical research, which endogenizes the number of electoral coalitions, is also mixed on the effects of majority requirements on the number of viable candidates. Assuming that parties are motivated by policy and, thus, restricted in positions and that voters choose sincerely (i.e., for their most preferred candidate or party), Osborne and Slivinski (1996) show that majority requirements lead to greater numbers of candidates receiving positive vote shares. In contrast, modeling strategic voting (where voters are willing to vote for their second preference under the right conditions), Callander (2003) demonstrates that only two electoral coalitions are viable in equilibrium. In Callander's model there are two initial parties and the majority requirement deters entry by a third. Callander suggests that his model is really applicable to situations where there is already an existing dominant two party system such as in the U.S. south and Australia. In these cases, introducing majority requirements deters entry of third parties and candidates. However, Callander also suggests that, in countries where there is an existing multiparty structure (more than two viable electoral coalitions), institution of a majority requirement does not reduce the number of candidates as in the French Fifth Republic (the current French political system). Callander's contention might also explain Golder and

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view of the case: "Because this rule combines with local racism, almost half the voters for over a century never enjoyed any opportunity to choose who represents them. As a numerical, stigmatized, and racially isolated minority, blacks regarded the majority vote requirement as simply a tool to 'steal the election'—a tool that had the effect of demobilizing black political participation, enhancing polarization rather than fostering debate, and in general excluding black interests from the political process." (1994, p. 11).

[5] An often cited instance is the defeat of Mickey Michaux in the runoff for North Carolina's Second Congressional District in 1982 after achieving a plurality in a primary election. In comparison, Carol Mosely-Braun achieved the Democratic nomination for the Senate in 1992 in Illinois with a plurality of the vote in a three-person contest. Mosely-Braun's vote share was 38%, Alan J. Dixon's 35%, and Albert F. Hofeld 27%. In the general election, Mosely-Braun received 53% of the votes, Richard S. Williamson received 43%, and 4% of the vote went to minor candidates.

Clark's (2003) analyses of the effects of majority requirements in presidential systems since, in many of these systems, the legislature is selected through proportional representation providing an already existing set of multiple parties to field candidates for the presidency.

If Callander is right, then in a situation where there are three existing electoral coalitions, voter behavior in majority required elections should differ significantly from behavior in plurality rule elections. Under plurality rule, voters should coordinate into two larger groups, resulting in only two viable candidates. In this paper, we use experimental methods to examine the effects of majority requirements on voter coordination. We compare runoff systems with plurality rule elections when voters are divided into three major coalitions. Two of the coalitions have similar preferences and, together, constitute the majority of the electorate. The third coalition has distinctly different preferences and, while they are in the minority, would win a plurality election if the two major groups cannot coordinate on a single candidate.

Under majority requirements, we find that it is true that voters are less likely to coordinate into only two major coalitions prior to the election. However, majority voters use the results of the primary election and majority requirement as a coordination mechanism. The runoff allows the two groups of voters to combine their votes for a single candidate in the runoff. If there are multiple existing electoral coalitions, they do have an incentive to run individual candidates in the primary elections under majority requirements rather than coordinate on a common one as they might under plurality rule.

Nevertheless, our results do not suggest that majority requirements are necessarily "friendly" to minority voters. Because the majority requirement works so well as a coordination mechanism for the two majority groups of voters (better than the ways in which such voters coordinate under plurality rule in our experiments), the minority group of voters (who could win in a plurality rule election) ultimately loses in almost every election. Further, these voters cease to participate over time. Thus, our results support the argument of Guinier (1994) and other opponents that majority requirements hurt minority voters.

Experimental research is particularly well suited for our analysis since it allows us to control for many factors that cannot be controlled in the naturally occurring environment. For example, it is quite difficult to measure true voter preferences over candidates. In the laboratory, we can induce these preferences by paying voters based on the candidate elected. We can also test the two election systems under identical voter preference and candidate positions.

We do not claim experimental analysis substitutes for non-experimental empirical research. Instead, we believe that our work serves as a useful complement to non-experimental empirical research. Our experiments do not attempt to measure directly the effects of racial and ethnic attitudes or composition on voter behavior. Instead, they provide evidence on the likelihood of minority-preferred candidates winning in straight plurality rule elections versus those with majority requirements. The experiments also show how these institutions affect the choices of majority and minority voters. Abstracting from many possible confounding influences, they provide for clean predictions and comparisons across institutions.

In the next section we discuss our experimental design, the equilibria we expect to find, and our theoretically derived hypotheses. Section 3 discusses the results of our experiments and compares these results with our predictions and with the results of previous non-experimental empirical research. Section 4 concludes.

2. Experimental Design

The basic experimental design used to test the effects of majority requirements is simlar to that previously used in Forsythe, Myerson, Rietz, and Weber (1993 and 1996); Forsythe, Rietz and Weber (1996); and Rietz, Myerson, and Weber (1998). The experiment consisted of two sessions. The sessions are labeled CPSS and CPSSR for **C**omputerized, **P**lurality, **S**ingle-shot, **S**ymmetric-payoff elections without and with **R**unoffs. We conducted the sessions at the University of Iowa, drawing subjects from a subject pool of several hundred subjects recruited from the population of students attending M.B.A. and undergraduate classes in the Colleges of Business Administration and Liberal Arts.[6]

Each experimental session included 28 subjects or "voters." As subjects arrived for the experiment they were seated at computer terminals in a large classroom and given copies of the instructions for the session. The appendix contains the instructions for session CPSSR. Each subject's screen was concealed from the others by dividers. The instructions were read aloud and all questions were answered in public so that all the instructional information was commonly known. No other communication between subjects was allowed. Each subject was designated by a voter identification number.

In each period of the experiment, voters were divided into two voting groups, A and B, each with 14 of the 28 subjects.[7] Then, each voting group was further partitioned into three "types" of voters. Voter types differed by their payoffs conditional on the winner as given by Table 1. (Voter types are identified by their most preferred candidate here. They were identified only by number in the actual payoff tables.)

[Table 1 about here]

In the experimental design there are two "majority" candidates, **Orange** and **Green**, and one "minority" candidate, **Blue**. Eight voters (types orange and green) prefer either **Orange** or **Green** to **Blue**, while six voters (type blue) prefer **Blue** to either **Orange** or **Green**. Since **Blue** would lose in a pair-wise vote with either **Orange** or **Green** alone, **Blue** is a "Condorcet loser."[8] In the experiment, the names and orders of the candidates were randomly switched in each

[6] The CPSS experiments are also reported in Forsythe, Myerson, Rietz, and Weber (1993) and Rietz, Myerson, and Weber (1998).

[7] The number of voters may seem small relative to naturally occurring elections. However, a small number of voters is typical in laboratory research because it results a manageable group size, it allows for multiple replications and subjects can be paid meaningful amounts of cash to induce preferences across election outcomes. It is representative of a larger election if voters cast votes in blocs (each voter in our experiment would represent a single bloc). Finally, it is large enough for a meaningful coordination problem. Given an equilibrium distribution of votes (discussed later), no single voter can change the outcome. It can only be changed by a coordinated response.

[8] A Condorcet Loser is a candidate who would lose in a two way race against each other candidate. See Condorcet (1785).

group and in each period. However, for clarity of presentation we will refer to the minority candidate across elections and groups as **Blue**, though in the actual election the minority candidate might have been labeled **Orange**, **Green**, or **Blue**. Similarly, we will refer to the first listed majority candidate as **Orange** to allow identification of ballot position effects which may give an advantage to the first-listed candidates on the ballot (see Miller and Krosnick, 1998).

Within a group, each individual payoff schedule was identical except that each voter's type was highlighted on her own computer screen. Hence, each voter knew her own payoffs, the payoffs to the other voter types in the group and the number of voters of each type. Voters did not know the specific assignment of types to others in the room. In addition, the voters did not know the specific identities of others in their group.

In the plurality treatment, each period consisted of a single election round in which voters cast simultaneous ballots with three listed candidates. Results were revealed to the group only after everyone had voted or responded with an abstention. In the runoff treatment, each period consisted of an initial election in which voters cast simultaneous ballots with three listed candidates. Results of the first round were revealed to the group only after everyone had voted or responded with an abstention. After the first round, either a winner was declared or subjects were allowed to vote simultaneously in a second round with only the two leading candidates from the first round listed on the ballot. Again, results were revealed to the group only after everyone had voted or responded with an abstention.

After each period, voters were randomly reassigned to new groups and new types. Voters then used new payoff schedules with randomly rearranged with relabeled rows and columns. This allowed us to observe many different groups in each cohort while minimizing any repeated-game effects that might carry over from one group to the next.

In each session we conducted forty-eight elections or election series (an election series is a primary election followed by a runoff in the CPSSR elections). Therefore, each subject was a member of 24 different voting groups and participated in 24 different elections or election series. In total, there are 672 voter observations for an election cycle under each treatment.

In each election, whether a plurality or runoff, a voter could either abstain or cast one vote for one candidate. In CPSS a single plurality rule election was held in which the candidate with the most votes was declared the winner, whatever the relative size of the vote for that candidate. In CPSSR, a three-candidate election called a “preliminary” election was held first. A candidate was declared the winner if that candidate received 50% or more of the vote in the preliminary election. If no candidate received 50% of the vote, then the two top vote receivers would face each other in a second election called a "runoff." Voters in a group with a runoff were allowed to either vote for one of the two candidates in the runoff or to abstain. The winner of the runoff would then be declared the winner.

In CPSS, if a tie occurred between two candidates for first place, we selected the winner randomly. Specifically, we placed colored balls corresponding to the names of the tied candidates in a bucket and asked a subject to draw a ball from the bucket without looking. The candidate whose name was the same as the color of the selected ball was declared the winner. In CPSSR, if a tie occurred between two candidates for first place in a preliminary election, the tie was not broken. Instead, a runoff election between the tied candidates would be announced on the subjects’ computer screens and they would vote (or abstain) in the ensuing runoff election. If a tie occurred between two candidates for second place in the preliminary election and the first place candidate did not have 50% of the vote, then we used the tie-breaking procedure to determine which of the two trailing candidates would be in the runoff election with the leading candidate. If a tie occurred between the two candidates in a runoff election, we used the tie-breaking procedure to determine which candidate won.

After each election (regardless of type), subjects were informed (on their screen) of the vote totals received by each candidate, whether a winner was declared, and their payoff if a winner was declared.

3. Voting Equilibria

3.1. Plurality Elections

The three-candidate plurality rule game has been the subject of many theoretical analyses. Our theoretical analysis is based on the work of Myerson and Weber (1993). In the experiment we can think of voter *k* as choosing a vote vector, (v_O^k, v_G^k, v_B^k), where v_i^k is the number of votes voter *k* gives to candidate *i*. In the plurality rule game the only permissible vectors are (1,0,0), (0,1,0), (0,0,1), or, if voter *k* abstains, (0,0,0).[9] We assume that each voter seeks to maximize her expected utility gain from the outcome of the election. Hence, voters choose vote vectors that maximize their expected utilities. Define u_i^k as the utility that voter *k* receives when candidate *i* is elected; for simplicity we assume that u_i^k equals the payment voter *k* will receive when candidate *i* is elected.[10]

Utility maximizing voters will sometimes vote *strategically*, finding it optimal to vote for a candidate other than their first choice. Such voters are not only concerned with the payments they will receive if a candidate wins, but also with the likelihood that a candidate will win and that a single vote will determine who will win. Thus, how a voter perceives the relative likelihood of various "close races" should play a role in their voting strategy. Following Myerson and Weber (1993), we make two assumptions about voter perceptions of these probabilities:

1. Near-ties between two candidates are perceived to be much more likely than between three or more candidates.

2. The probability that a particular ballot moves one candidate past another is perceived to be proportional to the difference in votes cast on the ballot for the two candidates. The constant of proportionality is the subjective probability of the event that the candidates will be tied for first place in the election, called the *pivot probability*.

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[9] The notation here allows for more general voting rules. For example, "approval voting" allows voters to cast votes for as many candidates as they like. This adds the vote vectors (1,1,0), (1,0,1), (0,1,1) and (1,1,1) to the set of admissible vote vectors. For an analysis of approval voting and a rank-ordering rule (called Borda Rule) see Forsythe, Myerson, Rietz and Weber (1996).

[10] More general assumptions about voter utility functions will not change the qualitative results of our analysis. For a detailed general presentation of the theory see Myerson and Weber (1993).

The first of these assumptions is just the observation that if there are three random variables, the likelihood that all three will equal each other is an order of magnitude less than the likelihood that two of the three will happen to equal each other. The second is an innocuous assumption given the types of election rules we are studying. It says that, if a voter could cast two votes for a candidate, it would double the probability that they ballot cast by the voter is pivotal and, therefore, affects the election outcome.[11] The pivot probabilities are the recognition that the ballot cast by a voter will only matter if it changes the election outcome.[12]

Under these assumptions, Myerson and Weber show that voter *k* will choose a vote vector to maximize her expected utility, E(u^k):

$$E(u^k) = \begin{Bmatrix} v_O^k\left[p_{OG}^k\left(u_O^k - u_G^k\right) + p_{OB}^k\left(u_O^k - u_B^k\right)\right] + \\ v_G^k\left[p_{OG}^k\left(u_G^k - u_O^k\right) + p_{GB}^k\left(u_G^k - u_B^k\right)\right] + \\ v_B^k\left[p_{OB}^k\left(u_B^k - u_O^k\right) + p_{GB}^k\left(u_B^k - u_G^k\right)\right] \end{Bmatrix}$$

Where p_{ij} is voter *k*'s *perceived* probability that candidates *i* and *j* will be in a "near tie" for first place. The probabilities are known as the pivot probabilities.[13]

We define a *voting equilibrium* as follows:

Definition 1: A voting equilibrium is an election outcome for which there exist perceptions that simultaneously justify the voter behavior leading to that outcome, assign positive (although perhaps very small) pivot probabilities to all candidate pairs, and are rationalized by the outcome (in the sense that candidates receiving high vote totals are perceived to be much more likely to be involved in near-ties for victory than are candidates with low vote totals).

Further, we define two classes of voter behavior according to:

Definition 2: Voter *k*'s vote vector is *sincere* if $v_i^k = 1$, and candidate *i* is voter *k*'s most preferred candidate.

[11] This makes a difference when voters can rank order candidates (as they can under Borda rule), vote for multiple candidates (as they can under "approval" voting) or cast multiple votes for a single candidate (as they can under "cumulative" voting).

[12] A ballot can affect the outcome in two ways. First, it can create a tie. In this case, the candidate voted for goes from losing to a fifty percent chance of winning. Second, it can break a tie. In this case, the candidate voted for goes from a fifty percent chance of winning to winning outright.

[13] By "near tie" we mean a single voter's actions can change the outcome and, as a result, the voter's actions will make him or her pivotal in determining the election outcome. See footnote 12.

Definition 3: Voter *k*'s vote vector is *non-sincere* if v_i^k =1, and candidate *i* is *not* voter *k*'s most preferred candidate.

Finally, a vote vector may be either *rationalizable* or *dominated*:

Definition 4: Voter *k*'s vote vector is *rationalizable* if it provides the voter with the highest expected utility, given some perceptions of each candidate's probability of winning.

Definition 5: Voter *k*'s vote vector is *dominated* if there exists some other permissible vote vector that provides her with higher expected utility for all possible probabilities of each candidate winning (i.e., all rational perceptions).

For example, an "orange type" voter has a preference ranking as follows: **Orange** $\succ$ **Green** $\succ$ **Blue** (where "$\succ$" means "preferred to"). If she casts the vote vector (1,0,0), i.e., a vote for **Orange**, her vote is "sincere." Other vote vectors are "non-sincere." Some voter perceptions may rationalize sincere voting and some may rationalize non-sincere, but strategic, voting. For an orange type voter, (1,0,0) is optimal if she believes candidate **Orange** will be in contention and her vote is sufficiently likely to decide the race in favor of **Orange**. Alternatively, the vote vector (0,1,0) may prove optimal if she believes candidate **Green** is more likely to be in contention than candidate **Orange**. Voting for **Blue** and abstaining are always "dominated" vote vectors for orange voters (and green voters with preferences **Green** $\succ$ **Orange** $\succ$ **Blue**). These vote vectors always yield less expected utility than voting for **Orange** or **Green**. No perceptions could justify these choices. For blue voters (here with preferences **Blue** $\succ$ **Orange** $\approx$ **Green**) non-sincere votes are always dominated here.

Recall that Orange and Green voters constitute a split majority. Blue voters are a minority. There are three possible voting equilibria in the plurality rule game: **Orange** >> **Blue** >> **Green**, **Green** >> **Blue** >> **Orange** and Blue >> **Orange** $\approx$ **Green**; where *i* **>>***j* implies that candidate *i* is expected to receive strictly more votes than candidate *j* and $i \approx j$ implies that candidates *i* and *j* are in a close race. In the equilibrium **Orange** >> **Blue** >> **Green**, voters perceive a near-tie for first place between **Orange** (a majority preferred candidate) and **Blue** (the minority preferred candidate) to be much more likely than a near-tie for first place between **Orange** and **Green** (the two majority preferred candidates). Thus, all majority voters vote for

Orange and all minority voters vote for **Blue**, **Orange** and **Blue** become the two leading candidates and expectations are justified. In the equilibrium **Green** >> **Blue** >> **Orange**, voters perceive a near-tie between **Green** (a majority preferred candidate) and **Blue** (the minority preferred candidate) to be the most probable and, consequently, all majority voters vote for **Green** and all minority voters vote for **Blue**, again justifying expectations. In the equilibrium **Blue** >> **Orange** ≈ **Green**, voters perceive near-ties for the lead between **Orange** and **Blue**, and between **Green** and **Blue** to be likely with similar probabilities and much more likely than a near-tie for the lead between **Orange** and **Green**. Therefore, all voters vote sincerely, and Blue wins. This is the equilibrium in which the minority candidate (the Condorcet loser) wins. The voter choices for each equilibrium are summarized in Table 2.

[Table 2 about here]

Which equilibria do we expect to occur in the experiment? Clearly voter perceptions play a major role in determining the outcome of the plurality rule experimental elections. For a majority candidate to win, say **Orange**, voters must perceive that **Orange** is much more likely than **Green** to be in a close race with **Blue**. That is, voters must perceive that green voters will vote non-sincerely, but strategically, for **Orange**. Similarly, for **Green** to win, voters must perceive that orange voters will vote for **Green**. If voters do not believe that one of the two types of majority voters will vote non-sincerely, then the likely outcome will be the equilibrium in which **Blue**, the minority candidate, wins.

The symmetric payoff schedules and other design features provide few cues to coordinate majority voters on a candidate. One available cue is ballot position (the ordering of candidates on the ballot). Majority voters may use it to coordinate on one candidate. If voters do not coordinate on ballot position, we expect frequent wins by **Blue**, the minority candidate lacking other coordinating information.[14] Therefore, we expect frequent minority candidate

[14] In the discussion of our empirical results, we consider other possible coordinating mechanisms such as pre-election campaign contributions that exist in actual elections.

(**Blue**) wins and, to the extent that majority candidates win, we expect ballot order to be a strong predictor.

3.2. Majority Required Elections

The majority required election game entails a slight, but significant, change in the rules of the election game. In the majority required elections, if the first place candidate in the preliminary election does not achieve 50% of the vote, she faces the second place candidate in a runoff election. We begin our analysis of the majority requirement game by first examining voter strategies in runoff elections, then moving to strategies in the preliminary elections.

3.2.1. Strategies in Runoff Elections

Two categories of runoff elections may occur: a runoff between the two majority candidates or a runoff between a majority candidate and the minority candidate.

When the two majority candidates face each other in a runoff, optimal voter strategies are straightforward. Orange and green (majority) voters are expected to vote for their most preferred candidate. Blue (minority) voters are expected either to randomize or abstain since there is no perceived utility difference between the two runoff candidates. Therefore, blue voters should be indifferent between voting and abstaining. This leads to equal expected vote totals for the two majority candidates and frequent close races.

When one majority candidate and the minority candidate face each other in a runoff, optimal voting strategies are also straightforward. Orange and green voters will vote for the majority candidate and blue voters will vote for the minority candidate. Since voting is costless, and since minority voters perceive a difference between the majority and minority candidates, voting dominates abstaining. Recall there is always some perceived positive probability, however small, that the two candidates will be in a close race. We expect majority candidates to win these runoffs.

If there is a runoff election, the expected outcome is either a tie between the two majority candidates or a definite win for one. Minority candidates are expected to lose runoffs.

3.2.2. Strategies in Preliminary Elections

Dominated vote vectors under plurality rule elections are also dominated in the majority required preliminary elections. Blue (minority) voters will always vote sincerely for the **Blue** candidate in any equilibrium.[15] Orange and green (majority) voters will not vote for **Blue** in any voting equilibrium.[16] Will majority voters vote sincerely in equilibrium? They may. If they expect the preliminary election outcome **Blue** >> **Orange** ≈ **Green**, each majority voter will expect a runoff between a majority candidate and **Blue**. Regardless of which majority candidate is selected, **Blue** will lose the runoff with very high probability. The primary concern of the majority voters is which majority candidate will enter the runoff. Thus, orange voters will vote for **Orange** and green voters will vote for **Green**. Voting for the other majority candidate will only decrease the chances of the voter's preferred candidate entering the runoff and, ultimately, winning. This behavior reinforces the equilibrium.

Will majority voters vote non-sincerely in equilibrium? Again, they may. For example, suppose that voters expect preliminary election outcome **Orange** >> **Blue** >> **Green**. For this to be the outcome, green voters must vote for **Orange**. If a green voter changes her vote to

[15] This is because, by assumption, there is some positive (although perhaps very small) perceived probability that **Blue** could win the preliminary election with a majority of the vote. Moreover, there is some perceived positive probability that if **Blue** is in a runoff, a single vote could matter. Since there is some probability that a vote for **Blue** could affect the election outcome, and because they are indifferent between the two majority candidates, blue voters always receive a higher expected utility from voting sincerely than from voting non-sincerely.

[16] The vote vector (0,0,1) is dominated for these voters. Under any configuration of vote totals, majority voters will always expect a greater utility gain from voting for one of the majority candidates than for **Blue**. **Blue** winning outright is clearly the worst outcome for these voters, so if a voter's vote will determine whether **Blue** is in first place, the majority voters will not vote for **Blue**. If the vote configuration is such that voting for **Blue** will force one of the majority candidates into a runoff with **Blue**, a majority voter will vote for one of the majority candidates rather than face the small probability that the majority candidate will lose the runoff. Furthermore, abstention is also dominated for majority voters; these voters can always expect more utility gain from voting for one of the majority candidates than abstaining (given that voting is costless). And in a voting equilibrium, there is some positive probability that one of the majority candidates could be in a tie for first or second place.

Green, the most likely result is to force a runoff between **Orange** and **Blue**. While unlikely, **Blue**, may win this runoff.[17] Voting for **Green** may also increase the chances that **Green** will end up in a runoff with either **Orange** or **Blue**. **Green** will have a good chance of winning such a runoff. If the former effect dominates, the equilibrium is reinforced with green voters casting non-sincere, strategic votes. If the latter effect dominates, the voters move to the **Blue** >> **Orange** $\approx$ **Green** equilibrium in which all voters vote sincerely.

Thus, as in the plurality election game, there are three possible equilibria in the majority required election game:

Orange >> **Blue** >> **Green** candidate ranking in the preliminary election with candidate **Orange** receiving more than 50% of the votes and winning without a runoff.

Green >> **Blue** >> **Orange** candidate ranking in the preliminary election with candidate **Green** receiving more than 50% of the votes and winning without a runoff.

Blue >> **Orange** $\approx$ **Green** candidate ranking in the preliminary election with a runoff between **Blue** and either **Orange** or **Green** and the majority candidate winning the runoff.

The equilibria in the majority required election game lead to the same predictions about voter choices in the preliminary election as in the pure plurality election game. However, there is no equilibrium in which the minority candidate is expected to win in the overall election. Instead, the runoffs give a second chance to majority candidates (NOT minority candidates, as is sometimes argued).

Which equilibria do we expect in the experiments? Again, there is little in the experimental design in CPSSR (beyond the ballot position of the majority candidates) to facilitate coordination. On the other hand, the equilibrium **Blue** >> **Orange** $\approx$ **Green** is a much more attractive equilibrium to majority voters under the runoff system than under the plurality system. Whichever candidate is randomly determined to compete in the runoff, the result is expected to be better than having **Blue** win. Therefore, we expect to see this last equilibrium

[17] Our results suggest that this is very unlikely. However unlikely it is, it is possible for **Blue** to win if there is a runoff and **Blue** is in it. It is not possible for **Blue** to win if there is no runoff or **Blue** is not in it.

frequently. Further, we expect majority voters to vote sincerely more often in the preliminary elections than in the plurality elections.[18]

3.3. Implications of the Theory

In summary, our theoretical analysis of the two types of election games yields the following predictions about voter behavior in the two settings.

3.3.1. Expected Outcome Differences

In the plurality rule election game, an equilibrium exists in which minority candidates are expected to win. Moreover, this is the equilibrium we expect to observe most often in our experiments. In the majority required election game there are no equilibria in which minority candidates are expected to win. When there is a runoff, we expect it to be between the minority candidate and a majority candidate and we expect the majority candidate to win. When runoffs occur, we expect majority voters to coordinate on their preferred candidate. This dynamic implies that leaders in preliminary elections who face a subsequent runoff (most likely **Blue**) will be less likely to win than second-place finishers (most likely **Orange** or **Green**).[19]

3.3.2. Expected Voting Patterns

In the plurality rule election game, we expect to find minority voters voting sincerely and majority voters voting either sincerely or non-sincerely. When majority voters do not vote sincerely, we expect them to use ballot position as a coordinating mechanism and switch most often to the first-listed majority candidate. In the preliminary elections of the majority required election game, we expect to find minority voters also voting sincerely and majority voters voting

[18] The tendency for voters to vote non-sincerely less often is seen by many social choice theorists as an additional advantage to majority requirements. See for example Merrill (1984, 1988).

[19] This is contrary to the empirical evidence reported by Bullock and Johnson (1992) in which leaders in preliminary elections win approximately 70% of the time.

sincerely more often than in the plurality rule game. In runoff elections we expect to find all voters voting sincerely.

3.3.3. Other Implications

For minority candidates, runoffs should not give second chances. In the equilibrium in which the minority candidate finishes second in the preliminary election, a runoff election is not expected and, if it occurs, the minority candidate is expected to lose. When the minority candidate achieves a runoff, it should come after a first place finish in the preliminary election. The minority candidate is also expected to lose this type of runoff. Thus, real second chances only come to majority candidates who use the runoff process to build a coalition of support. This analysis fits with the Jackson-Guinier critique; that is, we expect majority requirements to reduce significantly the probability that minority candidates win the election game. Finally, while costless voting implies that all voters should choose to vote, we expect that minority voters will abstain more often in the majority required game, particularly in runoff elections. This arises because the probability of casting a vote that will result in the minority candidate winning the election is much smaller in the majority required game. Therefore, if there is some small positive cost to voting (e.g., effort in thinking about what to do), we expect higher abstention among minority voters. This fits with the empirical results on turnout levels in runoffs reported in Bullock and Johnson (1992) and Wright (1989).

4. Experimental Results

4.1. Election Outcomes

Overall, majority candidates are much more likely to win the experimental elections, and minority candidates are much more likely to lose, in the majority required election game than in the plurality game. Table 3 reports the election results for the plurality and majority required elections.

[Table 3 about here]

4.1.1. Plurality Election Results

In plurality elections, the minority candidate wins most of the time. The top section of Table 3 reports the number of wins and ties by each candidate in the 48 plurality elections. **Blue** wins 38 elections outright. In 8 of the 10 remaining elections, **Blue** is involved in a tie with a majority candidate. **Blue** wins these ties with probability 0.5. The pattern of outcomes changes little over time. **Blue** wins 8 of the first 12, and 8 of the last 12 elections. The fact that either majority candidate wins or ties at all suggests that there is some coordination among the majority voters. However, these attempts to coordinate are generally unsuccessful. Recall that **Orange** is the first-listed majority candidate. Thus, we may expect majority voters to coordinate on **Orange**. Indeed, **Orange** is involved in more ties in the later period, but with the small number of observations, this difference is not statistically significant.

4.1.2. Majority Required Election Outcomes

Adding a majority vote requirement changes the election results significantly. The second section of Table 3 reports the ultimate winners of the majority required election game. The minority candidate wins much less often when a majority vote is required. **Blue** wins only 9 of the 48 majority required elections, compared with 38 of the 48 plurality elections. Of these 9, 6 are won in preliminary elections and 3 are won in runoffs. Both majority candidates win much more often in majority required elections, with 19 victories for **Orange** and 15 for **Green**.

Table 4 reports χ^2 tests for independence between election results and election type. For each candidate, we compare the frequency of wins in the plurality elections and the majority elections (majority election wins include both preliminary or runoff wins). In each case, the calculated test statistic is much greater than the critical value of 6.64 for p<0.01, 1 degree of freedom.[20] Thus, we easily reject the hypothesis that election outcomes are independent of election type. **Blue** wins significantly more often in plurality elections, while both **Orange** and **Green** win significantly more often in majority required elections.

[Table 4 about here]

Tables 5 and 6 further break down the majority required election results into the preliminary and runoff phases. Table 5 presents the preliminary election results. The first section reports the number of outright (majority) wins when there are clear candidate rankings (i.e., no ties). The second section shows how often candidates achieved pluralities, but not majorities, with clear candidate rankings. Here, outright wins are much less prevalent than in plurality elections. Only 8 of the 48 preliminary elections produce a majority winner, with 6 captured by **Blue** and one each captured by **Orange** and **Green**. Most of the majority wins (5 of the 8) occur in the first 6 election periods. Pluralities often result (in 15 elections), with **Blue** generally receiving the most votes (attaining pluralities in 13 of these 15 cases). Pluralities tended to occur early with 7 in the first 12 election sequences and only 3 in the last 12 election sequences. The third and fourth sections of Table 5 show how often the preliminary elections resulted in ties for first or second place. Ties are much more prevalent than in plurality elections. More than half of the preliminary elections result in ties (25 of the 48). Generally these ties occurred in the middle and late periods (with no occurrences in the first 12 election sequences). Ties for first place occur in 9 of the elections, all between **Blue** and a majority candidate. As predicted, more of the first place ties are between **Blue** and **Orange**, suggesting an attempt by majority voters to coordinate their votes on the first-listed majority candidate. First place ties between the two majority candidates did not occur. Ties for second place are more common, occurring in 16 of the 48 elections. Nearly all of the second place ties (14 of 16)

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[20] This test statistic, developed by Pearson (1900), whether the frequencies of outcomes (here, the election winners) differ systematically across the treatment (here the election rules) or whether the deviations appear to be the result in random observational errors. Here, a test statistic above 6.64 indicates that there is a systematic difference across the types of elections. Tests statistics below 6.64 can be explain by random deviations in the data.

are between **Orange** and **Green**, corresponding to the voting equilibria we expected to observe most often.

[Table 5 about here]

Table 6 contains the runoff election results. The top section reports the runoff election winner when the runoff was caused by a plurality (but not a tie) in the preliminary election. Runoffs are separated by the participating candidates and which candidate led in the preliminary election. In these elections, **Orange** has a slight advantage, winning 5 of the 15 runoffs and winning 3 times after trailing **Blue** in the preliminary election. **Blue** and **Green** each win 3 runoffs and 4 end in ties. Each **Blue** win followed a preliminary election that Blue led. However, all 3 of the **Blue** runoff wins occur during the first 12 election sequences, suggesting majority voters learned to avoid this outcome in later periods.

The second section of Table 6 shows the outcomes after preliminary election ties. **Blue** fares even worse in the runoffs caused by ties in the preliminary election. In these elections, **Blue** never wins outright and ties with the majority candidate only once. After preliminary-election first-place ties between **Blue** and a majority candidate, the majority candidate wins all of the runoff elections. The majority candidates also won each runoff caused by second-place ties, except one that also ended in a tie. Thus, the evidence of minority-disadvantage from these runoffs is mixed but suggests the effects identified by Jackson and Guinier mentioned earlier. Minority candidates do not seem to benefit from second chances. If anything, majority candidates do, as predicted by theory.

[Table 6 about here]

4.2. Sincere, Non-sincere and Dominated Voting Choices

We now consider individual voter behavior in each setting. Table 7 breaks down the vote for each candidate by voter type. Votes for a subject's most preferred candidate are evidence of sincere voting. Votes for candidates other than the most preferred indicate either non-sincere, but strategic, votes or dominated votes.

[Table 7 about here]

4.2.1. Plurality Elections

In plurality elections, dominated vote vectors are rare. Minority voters rarely vote for either majority candidate (only 6/288 blue voters vote for **Orange** or **Green**), and majority voters rarely vote for the minority candidate (6 of 384 votes cast by majority voters were for **Blue**). However, we do observe that majority voters often vote for their second favorite candidate, which is evidence of strategic voting. Of votes cast by orange voters, 41% are for **Green**. Similarly, of votes cast by green voters, 43% are for **Orange**. This suggests majority voters realize they would gain if they could indeed coordinate and achieve an equilibrium in which a majority candidate wins. However, as the election outcome results above show, they are rarely successful. Further, ballot position does not play a significant role.

4.2.2. Majority Required Elections

All voter types overwhelmingly vote sincerely in the preliminary election of the majority required election game. As predicted, votes for a majority voter's second choice candidate are much less prevalent in preliminary elections than in plurality elections. Orange voters only cast 15 votes for **Green** in the preliminary elections compared with 79 in plurality elections. Similarly, green voters cast only 22 votes for **Orange** in preliminary elections compared with 82 in plurality elections. Majority voters also seldom vote for the minority candidate, though it is more prevalent here than in the plurality elections (with 18 votes for **Blue** cast by majority voters in preliminary elections). In contrast, blue voters cast more dominated votes in preliminary elections than in plurality elections, voting for majority candidates 31 times in preliminary elections compared with 6 times in plurality elections. This may reflect the fact that, for minority voters, the probability of their vote causing an ultimate win for their candidate is much smaller in the majority required election game than in the plurality rule election game. As these probabilities approach zero, the difference between the vote vectors becomes less significant and less likely to induce minority voters to vote for the minority candidate rather than randomly.

In the runoff phases of the majority required election game, all three voter types generally cast sincere votes. The last section of Table 7 shows that, when **Blue** makes the runoff, blue voters nearly always vote for **Blue** and those who do not split their votes roughly evenly between the majority candidates. When **Blue** does not make the runoff, blue voters split their votes between **Orange** and **Green**. This is as predicted. For majority voters, runoff elections can provide a mechanism that helps them coordinate their votes for a majority candidate. When **Blue** and **Orange** meet in the runoff, both orange and green voters vote for **Orange** and, as illustrated in Table 3, **Orange** usually wins. Similarly, when **Blue** and **Green** meet, both green and orange voters vote for **Green**. In both cases, this behavior is sincere in the sense that the majority voters are voting for their most preferred available candidate.

4.3. Abstention

As expected, we observe very little abstention in plurality elections. These results are reported in Table 8. Only 1.19% of all votes are abstentions. This entails abstention in 0.69% of votes cast by blue voters, 1.04% of those cast by orange voters and 2.08% of those cast by green voters. Most of the abstention is in the earlier periods, and none is observed in periods 19-24.[21]

[Table 8 about here]

[21] Our experimental design probably attenuates abstention. Subjects were required to remain in the laboratory until the experiments were completed, so choosing not to vote did not allow them to leave earlier. Further, subjects abstained "actively" by pressing the enter key on their keyboard, rather than "passively" as with real abstainers. We suspect this lead to fewer accidental abstentions but also to fewer purposive abstentions as well.

In majority required election games, the overall incidence of abstention is about the same as in pure plurality elections. However the distribution across voter types is much different. As expected, minority voters abstain at higher rates in both the preliminary (1.74%) and runoff (3.75%) elections than in plurality elections (0.69%). Majority voters abstain at a lower rate in the preliminary than they did in plurality elections, as do green voters in the runoff. The higher abstention of orange voters in the runoff phase is contrary to our expectations. Note that all of the majority voter abstention occurs in early periods, while most of the minority abstention occurs in later periods of the majority required game. These patterns of abstention suggest that over the 24 periods, majority voters realize they can affect electoral outcomes in both the preliminary and runoff phases and, so, continue to participate. In contrast, minority voters seem to learn that their participation cannot affect electoral results once majority voters begin to coordinate their behaviors and, so, show a greater propensity to abstain.

4.4. Coordination and Campaign Advertising

In naturally occurring elections other mechanisms may facilitate majority voter coordination in plurality rule, multi-candidate elections. Rietz, Myerson and Weber (1998) argue one such mechanism may be the use of campaign advertising. That is, majority voters may coordinate on the majority candidate who receives the greater number of campaign ads. If majority voters can use such coordination mechanisms effectively, it may reduce the importance of the institutional differences between plurality and majority required elections.

To prevent against unnecessarily biasing our results in favor of finding institutional effects and to improve the external validity of our analysis, we compare our results with those of Rietz, Myerson and Weber (1998). They run an experimental design labeled CPSSCF for **C**omputerized, **P**lurality, **S**ingle-shot, **S**ymmetric-payoff elections with **C**ampaign **F**inances. In CPSSCF, voters are allowed to buy campaign advertisements costing 1 cent each before an election. Voters may spend up to $0.20 for campaign advertising per election. Each campaign ad is represented by the associated candidate's name flashing in the appropriate color on the screens of all members of the purchaser's voting group. The total number of ads purchased in a voter's group by candidate type is also displayed in the voters' history boxes before each election.[22]

CPSSCF provides orange and green voters with a means to coordinate on one candidate. If voters observe large expenditures for one of the majority candidates, they may interpret that expenditure as a signal that other majority voters will vote for that candidate. We thus expect more non-sincere voting and fewer minority candidate wins in CPSSCF than in CPSS. Specifically, we expect fewer minority candidate wins than in plurality elections without campaign advertising. However, we still expect more minority candidate wins than in majority required elections. We expect runoffs to remain a more efficient coordination mechanism. Because they are not able to rely on runoffs, we also expect more non-sincere voting by majority candidates.

Table 9 reports the results of the plurality elections with campaign advertising. As predicted, **Blue** wins much less often than in plurality elections without campaign advertising, but more often than in majority required elections. Specifically, **Blue** wins 12 of the 48 CPSSCF elections, compared with 38 plurality elections and 9 majority required elections. More of **Blue**'s wins occur in early elections than in late elections. **Orange** and **Green** each win more elections than under pure plurality rule, and fewer than with majority requirements, as expected.

[Table 9 about here]

Table 10 reports sincere and non-sincere voting in elections with campaign ads. Compared with the plurality elections, majority voters in elections with campaign ads cast slightly more sincere votes and slightly fewer non-sincere votes for the other majority candidate. Presumably this is because they are casting fewer wasted votes. Minority voters behave about

[22] In this treatment, all subjects were asked to make their contributions simultaneously. After all subjects had responded, all subjects saw the "ads" at the same time and were given the totals on their private computer screens before being asked to vote simultaneously in the actual election.

the same as in plurality elections. Compared with the preliminary phase of majority required elections, however, majority voters cast fewer non-sincere votes and more sincere votes. Thus, rather than relying on runoffs to coordinate their votes, majority voters may be coordinating themselves by using campaign expenditures. However, the coordinating effect of runoffs is stronger and leads to even less minority representation.

[Table 10 about here]

5. A Comparison of Experimental and Empirical Evidence

Our experimental results mirror the empirical evidence on turnouts. Although voting is virtually costless in our experiments, we find that minority voters are less likely to vote in the majority required election game. We also find that the two majority groups of voters use the majority requirement as a coordination device and that typically all three candidates receive votes in the preliminary election, supporting the analysis of Golder and Clark (2003) and the hypothesis of Callander (2003) discussed in the introduction. However, we also find that coordination of majority voters is quite effective in shutting out the minority voters' preferred candidate, much more so than other methods of coordination in plurality rule elections such as campaign advertising.

6. Concluding Remarks

Our experimental evidence supports the contention that majority requirements reduce the ability of minority voters to elect the candidates of their choice. This remains true even when we allow majority voters an alternative means of coordinating their vote (campaign advertising) in plurality rule elections. Voters behave largely as predicted by the game theoretic model we study. In the plurality elections, majority voters are much more likely to vote in a non-sincere, but strategic, manner. In the majority required election game, all voters are more likely to vote sincerely (for their most preferred candidate). Majority requirements reduce minority voter turnout and result in minority voters making more "random" choices, reflecting the relative impotence of their votes.

We view our work as a complement to the existing empirical literature. The experiments provide clean tests of theory because they abstract from many problems that may arise in using naturally occurring election outcomes. However, they also abstract from many factors that may play important roles in determining election outcomes. For example, we did not explicitly consider the extent that racial or ethnic characteristics might influence election outcomes. Instead, we isolate the effects of majority requirements on pure substantive representation to provide a baseline for further research in such issues.

Appendix: **Experiment Instructions - Majority Required Elections**

GENERAL

This experiment is part of a study of voting procedures. The instructions are simple and if you follow them carefully and make good decisions, you can make a considerable amount of money which will be paid to you in cash at the end of the experiment.

The experiment will consist of a series of separate decision making periods. In each period you will have the opportunity to vote in a series of elections. The first election is called the "Preliminary Election." The candidates in the Preliminary Election are named Orange ("O"), Green ("G") and Blue ("B"). You must vote in this election according to the rules discussed below. If one of the three candidates receives more than 50% of the votes in the Preliminary Election, that candidate is declared the winner. For example, suppose Orange receives 10 votes, Green receives 4 votes, and Blue receives 1 vote. Orange is the winner since Orange has 10/15 = 66.67% of the votes in the Preliminary Election.

If no candidate receives more than 50% of the votes in the Preliminary Election, the two candidates who have received the most votes will be in a Run-off Election. For example, suppose Orange receives 6 votes, Green receives 7 votes, and Blue receives 2 votes. Green has the most votes, but does not have more than 50% of the votes (Green has 7/15 = 46.7% of the votes in the Preliminary Election). Because no candidate has more than 50%of the votes, Green and Orange (the two highest vote receivers in the Preliminary Election) will be in a Run- off Election. You must vote in this election for one of these two according to the rules discussed below. The votes cast in the Run-off Election will determine the winning candidate.

Remember that these are only examples and do not correspond to the actual outcomes that may occur in this experiment.

Suppose that two or more candidates receive the same number of votes in the Preliminary Election? If this happens there will always be a Run-off election since no candidate will receive more than 50% of the votes when there are "ties." If two candidates tie for "first place" (the two highest vote receivers have the same number of votes), then they will be the two candidates in the Run-off. But if two candidates tie for "second place" (for example, suppose Blue receives 7 votes and Green and Blue both receive 4 votes each) we will randomly determine which of the second place candidates will be in the Run-off. Specifically, we have a tie-breaking bucket and we have three colored balls: an orange one, a green one and a blue one. Balls corresponding to the tied candidates will be put in the bucket and one of you will be asked to randomly draw a ball from the bucket. The candidates whose name is the same as the color of the selected ball will be in the Run-off. What if all three candidates "tie" in the Preliminary Election? Then we will randomly draw select which two candidates are in the Run-off. One of you will be asked to randomly draw two balls from the bucket to select the two candidates for the Run-off. Suppose that there is a "tie" in the Run-off election? Again we will have one of you randomly select a ball from the bucket to determine the winner of the Run-off.

In the next period, the process will be repeated, with the exception that the identities of some of the members in your voting group will change. Your payoff in each period will depend upon which candidate wins the election series. (We will describe payoff schedules and the procedure for determining payoffs in more detail later.)

VOTING GROUPS

Initially, each participant will be assigned randomly to one of two groups of voters labeled group "A" and group "B". (When you have been assigned to a voting group, your participant identification number followed by your voting group's letter will appear at the top center of your computer screen.) In each period, two separate and totally independent election series will take place, each involving one of the two groups of voters. Your payoff will depend only on your decisions and those of the others in your group. The decisions made by the other group of voters will have no effect on your payoffs.

After each period, we will change the voting groups. When this happens, all participants will again be randomly assigned to one of two new groups. After each re-assignment, the members of the group you are in and the individual payoff schedules will generally not be the same as they were previously.

PAYOFF RULES

In each period, the payoff you receive will be determined by which candidate wins your voting group's election series. For each group you are in, a payoff schedule will automatically appear in the upper left corner of your computer screen.

There are three types of voters in each group. Voter types differ by their payoffs. The payoff schedule shows your voter type, how payoffs will be determined for your voter type, how payoffs are determined for other voter types and the number of voters of each type. As an example, suppose that you are initially assigned to a group with the payoff schedule displayed below:

Payoff from Winner			# of Voters
O	G	B	
$0.15	$0.35	$0.10	6
$0.35	$0.05	$0.20	6
$0.10	$0.00	$0.50	4

Your payoffs are determined by those listed in the highlighted row. Thus, your payoffs will be determined by the second row of the payoff schedule. You can also see that there are 5 other voters besides yourself with the same payoffs as you. There are 6 voters with payoffs corresponding to the first row of the payoff schedule and 4 voters with payoffs corresponding to the third row of the payoff schedule.

Your payoffs each period are determined by your row in the "payoff from winner" section. You will receive the payoff listed in your row under the winning candidate. Thus, if you had this payoff schedule, you would receive the following payoffs: $0.35 if the orange candidate (O) wins; $0.05 if the green candidate (G) wins and $0.20 if the blue candidate (B) wins. Thus, you receive the "payoff from winner" listed under the winning candidate.

Remember that this is only an example and does not correspond to the actual payoff schedules used in this experiment. Remember also that the winning candidate is the candidate who wins the entire election series in the period. That is, the winning candidate is either the candidate that wins the Preliminary Election with more than 50%of the vote or is the winner of the Run-off Election if no candidate wins the Preliminary Election with more than 50% of the vote. There is only one winning candidate in each election period in your voting group.

VOTING RULES

Each period, when an election is held, you must decide whether to abstain (not vote for any candidate) or cast a vote in your group's election. If you do decide to vote, you must do so according to the following rule (which applies to all voters in your group):

VOTING RULE: You must cast 1 vote for one candidate, and 0 votes for the others. You abstain by casting 0 votes for all three candidates.

(This rule will also be given in the "VOTING RULE BOX" which will automatically appear on your screen.)

Each period, before an election is held, a "BALLOT BOX" will automatically appear on your computer screen announcing the election. In the BALLOT BOX, the three candidates are listed separately. There is also a number below each candidate. At any given time, these numbers show the votes you would be casting for each candidate should you submit your ballot at that time. After all participants have been notified of the upcoming election, it will be held and you will be allowed to enter votes in the BALLOT BOX and submit your ballot.

When an election is held, a cursor will appear in your BALLOT BOX and you will be allowed to change the number of votes for each candidate on you ballot. To change the number of votes for a candidate, use the → and ← arrow keys to highlight the number below the candidate. Then use the ↑ and ↓ arrow keys to increase or decrease the number of votes you are giving to that candidate. As you change the number of votes for each candidate, the message on the right side of your BALLOT BOX will change. This message tells you whether your ballot is currently (1) valid according to the above rule, (2) not valid according to the above rule, or (3) an abstention.

Prior to submitting your ballot, make sure it is valid. If you submit an invalid ballot, you will receive a message in your BALLOT BOX stating that your ballot is invalid. You will have to change your ballot before re-submitting it. To submit your ballot, press the "Enter" key. If your ballot is valid, you will be asked to confirm your submission. If your ballot is satisfactory, press "y". If not, press "n" and you will be allowed to change the votes on your ballot. Note that in the Run-off Election a ballot will be invalid if you try to vote for a candidate who is not in the Run-off. You can only vote for the two candidates in the Run-off.

Even if you choose to abstain, you must submit a ballot. To abstain, enter zeros (0's) under each candidate and press "Enter". Then confirm this ballot by pressing the "y" key.

After all voters have submitted ballots, the computer will total the votes for each candidate. The votes cast by one voting group will have no effect on the other group's election. If the election is a Preliminary Election, after the votes have been tabulated the computer will determine if one of the candidates has received more than 50% of the votes or not. If one of the candidates has received more than 50% of the vote, the computer will determine your payoffs and notify you of the results. If no candidate has received more than 50% the computer will present you with a ballot for the Run-off Election. After the votes from the Run-off Election have been tabulated, the computer will determine your payoffs and notify you of the results.

NOTIFICATION AND RECORDING RULES

After each election series, you will be notified of the outcome in the following manner. After the election for your voting group, a "HISTORY BOX" will appear on the right side of your screen. It gives the votes you cast and the total votes cast by your group for each candidate. You may check your recorded vote in the election by comparing it to your previous ballot (which will remain in your BALLOT BOX). The HISTORY BOX also highlights the number of votes for the winning candidate in yellow and gives your payoff for that election. After voting groups are re-assigned, you will begin with a new HISTORY BOX. Thus, your HISTORY BOX only contains information from your current group.

You have also been given several Record Sheets that are similar to HISTORY BOXes. To have a permanent record of the information that will appear in your HISTORY BOXes, you should fill out a line in a Record Sheet for each election. First, record your ID number and group from the top center of your computer screen. Then you should record the event (election), how you voted and the outcome of the election in the spaces provided. You should also circle the vote total of the winning candidate and record your payoff for each election.

When the experiment is completed, the computer will sum your earnings from each election series and place the total on your screen. You can confirm this number by summing your earnings recorded on your record sheets. Please place this amount on your receipt. The experimenter will pay you this amount in cash.

If you have any questions during the experiment, ask the experimenter and he or she will answer them for you. Other than these questions, you must keep silent until the experiment is completed. If you break silence while the experiment is in progress, you will be given one warning. If you break silence again, you will be asked to leave the experiment and you will forfeit your earnings.

Are there any questions?

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Table 1: Payoff Schedule

	Winning Candidate			Number of
Voter Type	ORANGE	GREEN	BLUE	Each Type
1 (orange)	\$1.20	\$0.90	\$0.20	4
2 (green)	\$0.90	\$1.20	\$0.20	4
3 (blue)	\$0.40	\$0.40	\$1.40	6

Table 2: Equilibria and Consistent Vote Vectors for Plurality Rule

	Consistent Vote Vectors		
Voter Type	O>>B>>G	G>>B>>O	B>>O $\approx$ G
1 (orange)	(1,0,0)*	(0,1,0)**	(1,0,0)*
2 (green)	(1,0,0)**	(0,1,0)*	(0,1,0)*
3 (blue)	(0,0,1)*	(0,0,1)*	(0,0,1)*

*Sincere
**Strategic

Table 3: Summary of Election Outcomes

Plurality Elections

Periods	Wins			Ties		
	B	O	G	B & O	B & G	O & G
1-24	38	0	2	6	2	0
1-6	8	0	1	1	2	0
19-24	8	0	0	4	0	0

Majority Required Elections

Periods	Wins			Ties		
	B	O	G	B & O	B & G	O & G
1-24	9	19	15	3	1	1
1-6	7	2	0	3	0	0
19-24	0	5	6	0	0	1

Plurality Elections with Campaign Advertising

Period	Wins			Ties		
	B	O	G	B & O	B & G	O & G
1-24	12	17	11	3	5	0
1-6	4	2	4	2	0	0
19-24	1	5	3	0	3	0

Majority Required Elections with Campaign Advertising

Periods	Wins			Ties		
	B	O	G	B & O	B & G	O & G
1-24	17	10	21	0	0	0
1-6	6	2	4	0	0	0
19-24	3	5	4	0	0	0

Table 4: χ^2-Tests† of Significance for Difference in Winning Frequencies

Comparison	Candidate B	Candidate O	Candidate G
Plurality to Majority Required	48.6594* (0.000)	23.7134* (0.000)	12.1945* (0.002)
Plurality to Campaign Contributions	36.0533* (0.000)	20.8000* (0.000)	9.4112* (0.009)
Plurality to Majority Required and Campaign Contributions	41.5030* (0.000)	16.2000* (0.000)	21.7661* (0.000)
Majority Required to Campaign Contributions	2.5397 (0.281)	0.4238 (0.809)	1.9170 (0.383)
Campaign Contributions to Majority Required with Campaign Contributions	9.0146* (0.011)	6.3300* (0.042)	8.5487* (0.014)
Majority Required to Majority Required with Campaign Contributions	6.7040* (0.035)	9.4756* (0.009)	3.2759 (0.194)

† χ^2-Tests with 2 d.o.f. Prob.$>\chi^2$ in parentheses.
*Significant at the 95% level of confidence.

Table 5: Majority Required, Preliminary Election Results

	Majority Winner with Clear Candidate Ranking			Runoff Candidates with Clear Candidate Ranking		
Periods	B	O	G	B & O	B & G	G & O
1-24	6	1	1	10	3	2
1-6	4	1	0	6	1	0
19-24	0	0	0	0	1	2

	Runoff Candidates with 1st Place Ties			Runoff Candidate with 2nd Place Ties		
Period	B & O	B & G	O & G	B & (O or G)	O & (B or G)	G & (B or O)
1-24	7	2	0	14	1	1
1-6	0	0	0	0	0	0
19-24	3	0	0	5	0	1

Table 6: Majority Required Election Results for Runoff Elections

Runoff Elections After Preliminary Elections with Clear Candidate Rankings

Runoff Type	Preliminary Leader	Winner			
		B	O	G	Tie
B & O	B leads	2	3	-	2
	O leads	0	2	-	1
B & G	B leads	1	-	1	0
	G leads	0	-	1	0
O & G	O leads	-	0	1	0
	G leads	-	0	0	1

Runoff Elections with 1st Place Ties in Preliminary

Runoff Type	Leader	Winner			
		B	O	G	Tie
B & O	B & O	0	7	-	0
B & G	B & G	0	-	2	0
O & G	O & G	-	0	0	0

Runoff Elections with 2nd Place Ties in Preliminary

Runoff Type	Leader	Winner			
		B	O	G	Tie
B & (O or G)	B leads	0	5	8	1
O & (B or G)	O leads	0	1	0	0
G & (B or O)	G leads	0	0	1	0

Table 7: Sincere vs. Non-Sincere Voters

Plurality Elections

Voter Type	Votes for Blue	Orange	Green	Abstain	Total
blue	280	4	2	2	288
orange	3	108	79	2	192
green	3	82	103	4	192

Majority Required Preliminary Elections

Voter Type	Votes for Blue	Orange	Green	Abstain	Total
blue	252	17	14	5	288
orange	8	168	15	1	192
green	10	22	152	8	192

Majority Required Runoff Elections

	B&O Runoff Votes for		B&G Runoff Votes for		O&G Runoff Votes for	
Voter Type	Blue	Orange	Blue	Green	Orange	Green
blue	118	11	76	8	7	5
orange	7	81	2	52	12	0
green	9	79	2	54	0	12

Table 8: Abstention

Election Type	Period	Voter Type: Blue	orange	green	All Types
Plurality	1-24	.69%	1.04%	2.08%	1.19%
	1-6	2.78	0.00	2.08	1.79
	19-24	0.00	0.00	0.00	0.00
Majority - Preliminary	1-24	1.74%	.52%	.52%	1.04%
	1-6	1.39	2.08	2.08	1.79
	19-24	4.17	0.00	0.00	1.79
Majority - Runoff	1-24	3.75%	1.25%	0.00%	1.18%
	1-6	2.38	3.57	0.00	2.04
	19-24	6.94	0.00	0.00	2.98

Table 9: Election Outcomes for Plurality Elections with Campaign Advertising

Period	Wins			Ties		
	B	O	G	B & O	B & G	O & G
1-24	12	17	11	3	5	0
1-6	4	2	4	2	0	0
19-24	1	5	3	0	3	0

Table 10: Sincere vs. Non-Sincere Voters in Plurality Elections with Campaign Advertising

Voter Type	Votes for				
	Blue	Orange	Green	Abstain	Total
blue	273	7	5	3	288
orange	8	123	59	2	192
green	3	72	114	3	192

Table 11: Number of Runoff Elections

Treatment	Participating Candidate:			
	B	O	G	Overall
Majority Required	37	27.5	15.5	40
Majority Required with Campaign Contributions	9	4	7	10
χ^2-test of Difference†	0.8333 (0.659)	12.1212* (0.002)	10.7292* (0.005)	37.5652* (0.000)

†χ^2-test with 2 d.o.f. Prob$\geq\chi^2$ in parentheses.
*Significant at the 95% level of confidence.