Strategic Behavior in Multi-Alternative Elections:

A Review of Some Experimental Evidence[*]

by

Thomas A. Rietz[**]

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[*]I thank Robert Forsythe, Roger Myerson and Robert Weber for many helpful discussions about these topics. I also thank the Dispute Resolution Research Center at the Kellogg Graduate School of Management for funding my research in this area.

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I. Introduction

Political and economic systems exist because we must continually make choices as a society. In modern capitalistic democracies, we make major social decisions primarily through market and voting systems. Unfortunately, as Arrow (1963) points out, non-dictatorial social choice systems cannot aggregate preferences across multiple alternatives in a completely satisfactory manner. The particular shortcomings of election systems, known as election paradoxes, were noticed long before Arrow. As early as 1770, Borda stated:

> It is an opinion generally held, and I know not whether it has ever been objected to, that in an election by ballot the plurality of voices indicates the will of the electors, that is to say, that the candidate who obtains such a plurality is necessarily he whom the electors prefer to his competitors. But I am going to make it plain that this opinion, which is true in the cases where the election is conducted between two candidates only, may lead to error in all other cases.[1]

He illustrated his point with the following example. Suppose 21 voters participate in an election to select one of three alternatives labeled "A," "B" and "C." Suppose 8 voters have the preferences $A \succ B \sim C$, where $A \succ B$ indicates a strict preference for A over B and $B \sim C$ indicates indifference between B and C. Of the remaining 13 voters, 7 have the preferences $B \succ C \succ A$ and 6 have the preferences $C \succ B \succ A$. In a two-way election under plurality voting (one vote allowed per voter), B would beat A by 13 to 8 votes. Similarly, C would beat A by 13 to 8 votes. Borda argued that, because A would lose two-way races against either alternative, the electorate would prefer either B or C to A and A should not win the election. (Later, this became known as the "Condorcet criterion" and A known as a "Condorcet loser.") However, in the three-way race, A would win, receiving 8 votes to B's 7 and C's 6.

Borda's fears are realized whenever an alternative that would lose two-way races against each other alternative individually, nevertheless manages to win in the multi-alternative election. Hence, the "wrong" alternative wins the election. Riker (1982) argues convincingly that this is a problem in actual elections. He discusses two races in particular (the 1912 U.S. Presidential election and the 1970 New York Senatorial election) in which the majority would likely have voted against the three-way election winner in any two-way race. I will call this the "Condorcet paradox" because a Condorcet loser ends up winning the election. It has now inspired debate for over 220 years, motivating the works of Borda (1781), Condorcet (1785), Laplace (1812), Dodgson (1873 and 1876) and a myriad of later works. (See Black, 1958.)

Plurality voting is susceptible to Condorcet-type paradoxes whenever the majority is split between two or more preferred alternatives. Among others, both approval voting and Borda rule were introduced as ways to avoid this particular paradox under the assumption that voters vote sincerely. However, these voting rules are subject to a variety of other paradoxes as are all voting rules. (See Saari, 1989.) Thus, even under the simple assumption that voters vote sincerely, it is not clear which voting rule is "best."

Shortly after Borda presented the Borda rule as a means of avoiding the Condorcet paradox, John Adams noted an additional complicating factor: individuals might vote strategically. As he put it in a 1776 speech, "Reason, justice, and equity never had weight enough on the face of the earth to govern the councils of men. It is interest alone that does it, and it is interest alone which can be trusted...."[2] Laplace (1812) formalizes this idea, realizing that the electorate may consider the entire election a strategic game (albeit a large and important game) along the lines of modern game theory.

That strategic voting could dramatically affect elections was clear. It can easily result in the phenomenon known

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[1]Borda (1781), translated to english by Grazia (1953), who discusses how Borda first presented his ideas in 1770.

[2]De Grazia (1953) comments on this quote found in Burnett (1941).

as "Duverger's law." This is possibly the only tenet accorded the status of "law" in political science. As Duverger (1967, p. 217) puts it: "the simple-majority single-ballot system favours the two-party system." This statement can be justified only by the assumption that voters frequently vote strategically, i.e., voters focus on and cast votes for the most serious alternatives even when they prefer less serious alternatives (such as third party candidates). History, in the large, bears out Duverger's Law. Duverger (1967, p. 217) continues: "An almost complete correlation is observable between the simple-majority single-ballot system and the two-party system: dualist countries use the simple-majority system and simple-majority vote countries are dualist."

Thus, scholars have long recognized the possibility of strategic voting and the historical evolution of election systems is consistent with it. However, the norm in political science literature had been to assume sincere (i.e. non-strategic) voting. Only recently, have scholars begun modeling strategic voting behavior.[3] They have also only recently begun to investigate whether voters vote strategically in actual elections. Whether voters do vote strategically is an empirical matter. If voters cast strategic votes, determining the model which best describes their behavior is also an empirical matter. In addition, if voters cast strategic votes, election outcomes cannot be predicted by simply knowing the electorate's preferences. Thus, "who wins" elections under various election rules and how well each performs become empirical matters as well.

Here, I review experimental evidence designed to test several models of strategic voting classified into two types: bloc voting models (in which voters with the same preferences over the alternatives all cast the same, deterministic vote vectors) and individual voting models (in which voters with the same preferences may cast different vote vectors). In a controlled setting, the experimental evidence answers the empirical questions: Which alternatives win elections with specific types of electorates? Do Duverger's law type phenomenon arise naturally in experimental elections? If so, what promotes or discourages them? What voting rule performs "best" in this setting? Do voters cast strategic votes and, if so, how often? What model best describes voter behavior? What factors influence voter behavior and election outcomes in such controlled environments?

Briefly, the evidence suggests that Borda's fears are realistic for some situations. However, in the experimental elections, Condorcet losers usually ended up losing, while Condorcet winners (alternatives that would win two-way races against all other alternatives) usually ended up winning, independent of the voting rule used. Under plurality voting, Duverger's law tends to arise while, under other voting rules, it does not. The exception is under plurality voting when voters do not vote strategically (possibly because they are lacking the information necessary to do so). With enough experience and information, voters often vote strategically. When deciding how to vote, voters are influenced by previous election results when they participate in multiple elections with the same electorate. They are also influenced by pre-election poll results when polls are conducted before or between elections. When voters are restricted to voting as blocs, some bloc voting models fare better than others in explaining voter behavior. However, as a rule, voters *do not* vote as blocs when they are allowed to cast individual votes. Thus, while making less restrictive and more plausible assumptions, individualistic voting models also perform better in describing individual voter behavior and predicting the outcomes that can arise.

II. Theory

The voting rules I will focus on are plurality voting, approval voting and Borda rule. Under plurality voting, voters each cast one vote for a single alternative. Under approval voting, voters may cast one vote each for as many alternatives as they desire. Under Borda rule, voters rank order the alternatives and cast votes according to this order. If there are *n* alternatives, they can cast 0 votes for one alternative, 1 vote for a second, 2 votes for a third, etc., and cast *n*-1

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[3] For examples see Farquharson (1969), Merrill (1981), Niemi and Frank (1982 and 1985), Niemi (1984), Felsenthal (1990) and Myerson and Weber (1993).

votes for the last alternative. Under all three voting rules, the alternative with the most votes wins the election.

To discuss how voters vote relative to their preferences or how election outcomes compare to the social preference ordering, one must have a way to represent the electorate's preferences over alternatives in an election. Though it often gives more information than necessary, I will use payoff tables that give monetary values representing the utilities different voters have for each alternative if it wins the election.[4] This is convenient for illustrating the Condorcet paradox and for describing both the theories and experimental designs in the next sections.

As an example of a payoff table, consider Borda's (1781) example as given in Figure 1. Recall that, in this example, there are 21 voters, 8 of whom prefer *A* (voters of Type 1), 7 of whom prefer *B* to *C* and *C* to *A* (voters of Type 2) and 6 of whom prefer *C* to *B* and *B* to *A* (voters of Type 3). The values in the payoff table reflect these preference orderings by giving a payoff value to each voter type conditional on each alternative winning the election. Recall that, here, *A* is a Condorcet loser because the majority would prefer either *B* or *C* to *A* in two-way races. However, if voters each cast a vote for their first preference, *A* would win with 8 votes.

Insert Figure 1 about here.

Traditionally, literature on voting has assumed that voters vote sincerely. (For references to examples, see Black (1958) and Felsenthal (1990).) Under plurality voting, sincere voting means voters vote for their first preference. Under approval voting, sincere voting means that voters always vote for their first preference, never vote for their last preference and never vote for a less preferred alternative while not voting for a more preferred alternative. Under Borda Rule, sincere voting implies that voters' vote vectors rank the alternatives in the same order as their preferences. That is, they cast 0 votes for their lowest preference, 1 vote for their next lowest preference, etc., and *n*-1 for their first preference.

Given sincere voting and the electorate's preferences, one can easily determine the winner in any particular election by simply determining the sincere vote vectors. (For example, in Borda's example, *A* would win under plurality voting with 8 votes to *B*'s 7 and *C*'s 6.) Though relatively simple for predicting individual behavior, sincere voting points out the shortcomings of elections as social choice mechanisms. One example is the Condorcet paradox under plurality voting. While approval voting and Borda rule can avoid the Condorcet paradox when voters are sincere, they are subject to other paradoxes. Arrow (1963) shows that such paradoxes are unavoidable and Saari (1989) discusses their pervasiveness under sincere voting.

In 1795, Laplace discussed the possibility that voters might vote strategically.[5] Borda responded as if this were already obvious by stating, "My scheme is only intended for honest men." (See Black, 1958, p. 182.) However, knowing that voters might vote strategically is far easier than forming a theory about how strategic voters decide on the votes they will cast and determining what will happen in actual elections with strategic voting. Here, I will briefly discuss two general types of strategic voting models as described in recent papers. These are models that have been specifically tested using experiments. Then, I will discuss the results of the experiments designed to test these models.

A. Common Assumptions

Felsenthal (1990) contains detailed descriptions of the bloc voting models discussed here. See Myerson and

[4]For most examples I will discuss, a full payoff schedule is not necessary. Each voter's ordinal ranking of candidates would suffice. However, equilibrium calculations for mixed strategy equilibria under Myerson and Weber's (1993) model below will require cardinal rankings. Further, in the experiments discussed below, subjects actually received monetary payoff tables.

[5]See Black (1958) for a references to the date that Laplace first delivered "Leçons de Mathématics, données à l'École Normale en 1795."

Weber (1993, hereinafter MW) for a detailed description of their model. All the models share a common set of assumptions. Following Felsenthal (1990), they are:

(1) *Selection of One Alternative*: One among the k alternatives, one will be declared the winner.

(2) *Complete Information*: All voters know the entire electorate's ordinal preferences over the alternatives. That is, they know at least the ordinal rankings described in the payoff table and the number of voters of each type.

(3) *Random Tie-Breaking*: When more than one alternative tie for the most votes, the winner is chosen randomly with all tied alternatives being selected with equal probability.

(4) *Admissible Strategies*: Voters do not cast vote vectors that are dominated. Dominated vote vectors are ones that can never favorably affect the election for a given voter. Under plurality voting, this implies voters never vote for their last preference. Under approval voting, it implies that voters always vote for their first preference and never vote for their last preference. Under Borda rule, it implies that their vote vector never ranks their first preference last or their last preference first.

(5) *Non-Cooperative Action*: At the voting stage, voters participate in a non-cooperative game.

B. Bloc Voting Models

In addition, the bloc voting models assume that voters with the same preferences vote in an identical, deterministic manner. They differ in how voters arrive at the vote vector they will cast. The descriptions here follow Felsenthal (1990), who has a more detailed description along with examples.

Sincere voting (Model "S") is trivially a bloc voting model. Voters with the same preferences will cast identical vote vectors if they all vote sincerely. To determine their votes, voters do not have to consider, or even have information about, the electorate, other voters' preferences or how other voters or blocs will behave. Voters simply decide their own preference ordering over alternatives and vote accordingly. In Borda's example, Model S predicts the sincere outcome under plurality voting, realizing Borda's fears.

In Farquharson's (1969) model (Model "F"), voters first recognize that no voting bloc will cast a dominated vote vector. Given this, each voter bloc determines whether it has a "primarily admissible" strategy. Such a strategy is a vote vector that gives the bloc a preferred outcome regardless of how other blocs vote. Next, assuming that blocs with primarily admissible strategies use them, each remaining bloc determines whether it has a "secondarily admissible" strategy. This is a vote vector that gives preferred outcomes regardless of how other remaining blocs vote. Blocs continue to eliminate strategies in this manner until either (1) a majority is locked into a set of strategies that determine the unique predicted outcome or (2) the outcome is indeterminate because no more blocs have next-level admissible strategies and the remaining outcomes can produce different winners. Thus, Farquharson's model works by successive application of the assumption that blocs will choose dominant strategies given the strategies that they know other blocs *will not* choose. In Borda's example under plurality voting, the primarily admissible strategy for Type 1 voters is to vote for A. The outcome is then indeterminate because Type 1 and 2 voters do not have secondarily admissible strategies.

Niemi and Frank (1982) propose a "simpler" model of voter behavior (Model "NF"). First, each voter assumes all blocs will vote according to the status quo. The first status quo is all blocs voting sincerely. Second, given the status quo, each bloc asks whether it can change the outcome to a preferable one by changing only its own vote vector. If not, then the status quo outcome is the predicted outcome. If one bloc can change the outcome favorably, then all voters assume that this bloc changes its vote. This creates a new status quo and the process reverts to the first step. If two blocs can change the outcome favorably for themselves, each of these blocs assumes it is in a 2×2 game. The strategies in this game involve choosing between the undominated vote vectors for each voting bloc assuming all uninvolved blocs do not change their votes. If either involved bloc has a dominant strategy, voters assume that the bloc with the dominant strategy will use it. Again, this creates a new status quo and the process reverts to the first step. If not, the outcome is indeterminate. In Borda's example under plurality voting, the initial status quo results in 8 votes for A, 7 votes for B and 6 votes for *C*. Both Type 1 and 2 voters can change the outcome to a preferable one by changing their votes. However, neither has a dominant strategy in the resulting 2×2 game. Thus, again, the outcome is indeterminate.

Felsenthal, Rapoport and Maoz (1988, hereinafter FRM), Felsenthal (1990) and Rapoport, Felsenthal and Maoz (1991, hereinafter RFM) present a series of models that allow tacit cooperation between voting blocs in elections among three alternatives. In RFM, they reject an assumption of their earlier models as unrealistic and present their most advanced model (Model "RFM"), which I will discuss here. They first define the "winning set," *S*, of election alternatives. The winning set consists of the alternatives which receive weakly more votes than any other alternative under sincere (plurality) voting. They then define sets of "tacit coalitions" of voters for each alternative. The tacit coalition for alternative *i*, denoted *T*(*i*) includes all voters who prefer *i* above all other alternatives. The coalition also includes two types of voters for whom *i* is the second preference. First, if *i* is not in the winning set, the tacit coalition will include any such voters who's last preference is in the winning set. Second, if *i* is in the winning set, the tacit coalition will include any such voters who's first preference is not in the winning set. For instance, in Borda's example, the winning set is {*A*}. The tacit coalition for *A*, *T*(*A*) consists only of Type 1 voters. The tacit coalitions for *B* and *C*, *T*(*B*) and *T*(*C*), both consist of the Type 2 and 3 voters.

RFM's model involves a series of comparisons between tacit coalitions for each bloc's first, second and third preferences. While they ignore *Step 2* when making predictions later in their paper, I will present their model as given in RFM (pp. 209-210) with some additional clarifying statements in brackets.

Step 1. Identify the winning set *S*.

Step 2. Is there any alternative in *S* whose tacit coalition controls an absolute majority of the votes?

If yes, call such an alternative a *winner* and go to *Step 9* (vote sincerely).

If no, go to *Step 3*.

Step 3. Does the tacit coalition over the bloc's[6] first preference control more votes than the tacit coalition over its last preference?

If yes, go to *Step 4*.

If no, go to *Step 7*.

Step 4. Does the tacit coalition over the bloc's second preference control more votes than the tacit coalition over its last preference?

If yes, go to *Step 5*.

If no, go to *Step 9* (vote sincerely).

Step 5. Does the tacit coalition over the bloc's first preference [including its votes] control more votes than the tacit coalition over its second preference, excluding its votes?

If yes, go to *Step 9* (vote sincerely).

If no, go to *Step 6*.

Step 6. Does the tacit coalition over the bloc's first preference [including its votes] control exactly the same number of votes as the tacit coalition over its second preference, excluding its votes?

If yes, go to *Step 11* (the vote is indeterminate).

If no, go to *Step 10* (vote strategically).

Step 7. Does the tacit coalition over the bloc's second preference control more votes than the tacit coalition over its last preference?

If yes, go to *Step 8*.

If no, go to *Step 11* (the vote is indeterminate).

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[6]Since they apply their model to experiments in which each bloc is represented by a single voter with a scaled vote vector, they replace blocs by voters in their definitions.

Step 8. Is the bloc's first preference included in [the winning] set *S*?

If yes, go to *Step 11* (the vote is indeterminate).

If no, go to *Step 10* (vote strategically).

Step 9. Vote sincerely [for the bloc's first preference under plurality voting and only for the bloc's first preference under approval voting].[7]

Step 10. Vote strategically [for the bloc's second preference under plurality voting and for the bloc's first and second preferences under approval voting].[7]

Step 11. The vote is indeterminate [between the bloc's first and second preference under plurality voting and between only the bloc's first preference and both the bloc's first and second preference under approval voting].

Insert Figure 2 about here.

Figure 2 gives a flowchart for Model RFM. Though, strictly speaking, Model RFM assumes strict preferences, it can be used for Borda's example. If Type 1 voters are actually indifferent between *B* and *C* ($A \succ B \sim C$), they will choose their only undominated vote vector and vote (sincerely) for *A*. Type 2 voters ($B \succ C \succ A$) and Type 3 voters ($C \succ B \succ A$) both arrive at sincere outcomes after answering "yes" at *Step 3*, *Step 4* and *Step 5*. Thus, the predicted outcome is the sincere one, realizing Borda's fears. However, suppose Type 1 voters prefer *C* slightly to *B*. Then, though the bloc sizes and tacit coalitions stay the same, the outcome may change radically. After answering "yes" at *Step 4* and "no" at *Step 7*, Type 1 voters find that their vote is indeterminate. They will either vote for *A*, leaving the outcome unchanged, or they will vote for *C*. This changes the outcome from *A* winning by 8 to 7 to 6 votes to the outcome *C* winning by 0 to 7 to 14 votes. (Similar arguments apply if Type 1 voters prefer *B* slightly to *C*, leading to an indeterminacy between *A* and *B*.)

C. Individual Voting Models

Bloc voting models share three problems in common. First, is it reasonable to assume that voters of like preferences vote in the same, deterministic manner? Niemi and Frank (1982) give a standard argument:

> Bloc voting could occur as a result of explicit coordination…as where groups of voters act as disciplined parties. Or it could be a result of tacit coordination.…Each voter is likely to see his interests as identical to those of all the voters who hold the same opinion as himself, and likewise for those holding other opinions, and as a consequence presumably analyzes the strategic situation in terms of blocs (of known size) of like-minded individuals.[8]

This may be a reasonable description of the logic that would lead a bloc of voters to cast identical votes. Whether they do so is an empirical matter, which I will discuss later.

Second, bloc voting models often result in indeterminacies, such as those seen above for Borda's example. Though some give rise to fewer indeterminacies than others, none give any guidance in resolving the indeterminacies that do arise. We might expect any piece of public information to give such guidance. (For instance, in Borda's example, Type 1 and 2 voters may coordinate on *B* because *B* has more supporters than *C*. In the slight deviation from Borda's example considered with Model RFM, Type 1 voters may recognize that voting for *C* would be foolish given the votes of the other voters.)

Third, according to bloc voting models, small changes in bloc sizes or in preferences for a few voters within a

[7]As I will below, RFM do not use the standard definition of strategic voting under approval voting. Instead, they call voting for both the voter's first and second preference strategic. Authors usually define this as sincere since the ranking according the vote vector weakly matches the voter's preferences. However, RFM's definition does distinguish between subjects voting for only their first preference or both their first and second preferences, which, in a sense, is more strategic.

[8]Niemi and Frank (1982), page 153.

bloc can lead to dramatically different predictions both at the individual behavior and election outcome levels. (These result because such small changes can break blocs or change relative bloc sizes.) This is possibly the worst problem with bloc voting models because models are, at best, only approximations of reality. Therefore, proposed models should pass the basic test that their predictions not change drastically with slight changes in their parameters. (More precisely, predictions should vary upper-hemicontinuously in the parameters of the model.) Bloc voting models fail this test.

Individual voting models allow voters of like preferences to cast independent votes. While, they may vote as a bloc by accident, explicit or tacit coordination, voters in a bloc are not restricted to do so. Myerson and Weber's (1993) model (Model "MW") passes the continuity test. Small changes in the number of or preferences of voters within a voter type result in small changes in the predictions. Finally, voters are assumed to follow a relatively simple decision making process: given expectations about their abilities to affect the election outcome in various ways, voters simply maximize their expected utility. Though they suggest nearly any public event can serve to create expectations (i.e., polls, party systems, endorsements, etc.), MW leave the expectations formation process unspecified. This process may be better left as an empirical matter.

MW recognize that a (single) voter can affect the election outcome only if two or more alternatives receive vote totals which are nearly equal and exceed the vote totals of all other alternatives. How the voter perceives the relative likelihood of various "close races" should play a role in ballot choice. They assume the following: First, voters perceive near-ties between two alternatives as much more likely than between three or more alternatives. Second, voters perceive the probability of a particular ballot moving one alternative past another as proportional to the difference in votes cast on the ballot for the two alternatives. Finally, voters seek to maximize their expected utility gain from the outcome of the election. Let K be the set of k alternatives in an election and V be the set of admissible vote vectors over the alternatives. Then a voter who assigns utility u_i to the election of alternative i and perceives the likelihood of a near-tie between alternatives i and j to be p_{ij} will cast the vote vector $(v_1,\ldots,v_k)$ which maximizes:

$$\sum_{i\in K}\sum_{j\neq i} p_{ij}(u_i-u_j)(v_i-v_j) \;=\; \sum_{i\in K} v_i \sum_{j\neq i} p_{ij}(u_i-u_j). \qquad \textbf{(1)}$$

If all of the perceived pivot probabilities are equal, this simplifies to:

$$\max_{v\in V} \sum_{i=1}^{k} v_i(u_i-\bar{u}), \qquad \textbf{(2)}$$

where $\bar{u} \;=\; \frac{1}{k}\sum_{i=1}^{k} u_i.$

In Borda's example under plurality voting, three equilibria can arise. If neither alternative B nor C appears more likely to beat alternative A, then all voters will vote sincerely and Borda's fears will be realized. If neither B nor C appears to have any advantage as a challenger to A, voters have no incentives to change their votes. However, if Type 2 and 3 voters can identify either alternative B or alternative C and the stronger contender, they will all vote for this alternative. Thus, depending on which alternative becomes focal, either B or C will win by a vote of 13 to 8. This results in a Duverger type effect because the losing majority alternative will receive zero votes. The "strategic" Type 2 and 3 voters (those who vote for their second preference) have no incentive to change. At equilibrium, voting for their first preference will increase the chance that A wins much more than the chance that their first preference wins. A very simple piece of information that can focus these voters is that more of them prefer B to C than vice versa. Other information could include pre-election polls, ballot order, previous election outcomes, etc.

III. Experimental Evidence

FRM (reproduced in Felsenthal, 1990) and RFM test experimentally the bloc voting models discussed above. Forsythe, Myerson, Rietz and Weber (1992 and forthcoming, hereinafter FMRW1 and FMRW2), test MW's model. Here, I will discuss briefly the experimental designs of FRM, RFM, FMRW1 and FMRW2. The original papers contain detailed descriptions. Then, I will discuss the evidence they provide about the issues discussed in the introduction. Both provide evidence on strategic voting behavior, election winners and the Condorcet criterion. FMRW1 and FMRW2 address whether voters use election histories or pre-election polls as focal signals. They also address whether blocs of voters with the same preferences vote as blocs. Felsenthal (1990), FMRW1 and FMRW2 give evidence on the prevalence of Duverger's law.

A. Experimental Design

Each experimental design consisted of several sessions using subjects recruited from university populations as voters. For each session, subjects received instructional information and had any questions answered. Subjects each participated as members of several "voting groups" in several elections. Each voting group participated in a pre-determined and commonly known number of one or more elections between three alternatives. In each election, the voting group was divided into voters of several blocs or "types," differing by their payoffs conditional on the winning alternative. Groups and voter types within groups differed from each other in the makeup of their (cash induced) preferences over alternatives. Voters received complete information about their groups in the sense that they knew these induced preferences exactly. At the end of the sessions, subjects received cash payments based on the election winners for the voting groups in which they participated.

The elections were conducted either under plurality voting, approval voting or Borda rule. All voting groups in a session used the same voting rule. Example descriptions of the voting rules (from FMRW1) are:

Plurality Voting: "If you do not abstain, you may vote for at most one candidate. To do this, place a check next to the candidate for whom you are voting."

Approval Voting: "If you do not abstain, you may cast one vote each for as many candidates as you wish. To do this, place a check next to each candidate for whom you are voting."

Borda Rule: "If you do not abstain, you must give two votes to one candidate and one vote to one of the other candidates. To do this, write '2' next to the candidate to whom you are giving two votes and write '1' next to the candidate to whom you are giving one vote."

In practice, subjects could cast the vote vectors (1,0,0), (0,1,0), (0,0,1) under plurality voting. Under approval voting, they could also cast the vote vectors (1,1,1), (1,1,0), (1,0,1) and (0,1,1). Finally, under Borda rule, they could cast the vote vectors (2,1,0), (2,0,1), (1,2,0), (0,2,1), (1,0,2) and (0,1,2). In FMRW1 and FMRW2, voters could also abstain by casting the vote vector (0,0,0).

After each election, the alternative with the most votes was declared the winner and subjects were paid accordingly. If a tie occurred between two or more alternatives, the winner was selected randomly with the tied alternatives having equal probabilities of being selected. After each election, subjects received notification of the number of votes received by each alternative, the election winner and their payoffs.

1. Specific Features of the FRM and RFM Designs

FRM and RFM enforce bloc voting as follows. Each voting group consisted of 4 to 6 subjects. Each subject represented one "bloc" and received unique payoffs conditional on which alternative won. Vote vectors were scaled by the bloc sizes. For example, one subject may represent a bloc of size 7. If that subject voted for alternative *A*, then alternative *A* would receive 7 votes as a result.

Each voting group participated unchanged in 6 elections. In each session, subjects participated in 7 or 8 voting groups. Thus, each subject participated in 42 or 48 elections. Average total payoffs were in the $4 range per subject according to Felsenthal (1990).

FRM and RFM choose to study a variety of different preference structures for their electorates. They study both plurality and approval voting. Table I through Table V give the electorates studied by FRM and RFM. The tables also give the voting rule used in each group along with voting and winning frequencies. I will discuss the results later.

Insert Table I through Table V about here.

2. Specific Features of the FMRW1 and FMRW2 Designs

FMRW1 and FMRW2 allow voters with identically induced preferences to cast independent, possibly different, ballots. Each voting group consisted of 14 subjects divided into three voter types with 4 to 6 voters of each type. Each voter had one ballot that they could cast independent of the ballots of other votes of their type.

In FMRW1, each subject participated as a member of three voting groups and in eight elections in each group. In the two new sessions in FMRW2, voters participated in 24 groups with a single election in each group. Thus, subjects in each session participated in 24 elections. Average payoffs were in the $20 range per subject.

Instead of studying many preference structures, FMRW1 and FMRW2 choose to study in detail preferences similar to Borda's example (without the asymmetry in the numbers of Type 2 and 3 voters). Thus, each electorate in FMRW1 and FMRW2 had a payoff structure similar to Figure 3. Rows, columns and alternative names were randomly shuffled for each voter group. Then, for reporting purposes, the data was re-ordered to reflect this standardized payoff table. In addition, the 28 participants in each session were randomly assigned to two, 14 member voting groups with two separate elections in each period. Thus, subjects did not know which other subjects were members of their voting group at any given time.

Insert Figure 3 about here.

FMRW1 study plurality voting, approval voting and Borda rule using this electorate structure. FMRW2 study only plurality voting. Both also study the effects of non-binding, pre-election polls (of the entire electorate) on the outcome. Table VI and Table VII give the electorates studied by FMRW1 and FMRW2. The tables again give the voting rule used in each group along with voting and winning frequencies. Again, I will discuss the results later.

Insert Table VI and Table VII about here.

B. Condorcet Winners and Losers, Sincere Winners and Losers and Actual Winners and Losers

Do voters vote sincerely and elect the sincere winner? Are Borda's fears realized in actual elections? Do Condorcet losers ever win, sometimes win or often win in actual elections? Or do voters always, usually or sometimes manage to avoid the Condorcet paradox in actual elections?

FMRW2 study the preferences closest to Borda's example: their symmetric payoff schedule in "one-shot" elections. In these elections, with no shared electorate history, the Condorcet loser (Blue) won 87.50% of the elections, while the other two alternatives (Orange and Green) each won only 6.25% of the elections. Of the votes cast in these elections, 73.07% were sincere. The majority of voters seldom successfully coordinated enough strategic votes to defeat the Condorcet loser. Thus, Borda's fears are easily realized in actual elections.

In contrast, a shared history, a pre-election poll or features of the payoff schedule usually led to the defeat of Condorcet losers. In FMRW2, electorates who participated only in a non-binding poll before voting in the election were generally able to coordinate enough strategic votes to defeat the Condorcet loser. In the one-shot elections following a poll under the symmetric payoff schedule, the Condorcet loser won only 33.33% of the elections overall and only 16.22% of the elections that followed polls in which either Orange or Green led the other of these two alternatives. Thus, a coordinating signal as simple as a poll lead for an alternative can serve as a coordinating signal strong enough for strategic voters to defeat a Condorcet loser. In the repeated elections of FMRW1, FRM and RFM, Condorcet losers also usually lost.

FRM and RFM study a variety of preference structures in similar repeated election environments. Thus, their data provides more evidence about the effects of Condorcet rankings and rankings according to sincere voting on the likelihood of various alternatives winning elections. Figure 4" shows the effects of both rankings on win frequencies under plurality voting in repeated elections. The Condorcet ranking predominates in determining the wining frequencies. Condorcet winners were far more likely than other alternatives to win elections. Condorcet losers seldom won elections. In contrast, the ranking according to sincere voting had little effect when Condorcet winners existed. However, alternatives ranked first according to sincere voting fared somewhat better than other alternatives when a Condorcet cycle existed (i.e., *a* would beat *b*, *b* would beat *c* and *c* would beat *a* in two-way races). Similar results hold in FMRW1. In repeated, plurality voting elections under their symmetric payoff schedule, the Condorcet loser won only 26.04% of the elections, while the other alternatives won 73.96% of the elections. Pre-election polls reduced the frequency of Condorcet losers winning to 19.79%.

Insert Figure 4" about here.

Figure 5! shows similar effects under Approval voting. In the FRM and RFM data, Condorcet losers were even less likely to win. Again, a top ranking according to sincere voting helped when a Condorcet cycle existed. In FMRW1, the Condorcet loser won 9.03% of the repeated, approval voting elections. However, with intervening, pre-election polls, this number rose to 21.53%.

Insert Figure 5! about here.

FMRW1 also study Borda rule under their symmetric payoffs in repeated elections. The Condorcet loser won 9.72% of the repeated elections and 11.11% of the repeated elections with intervening polls.

Thus, Borda's fears are seldom realized in repeated elections under full information about the electorate's preferences. Usually, voters could coordinate their votes and defeat Condorcet losers. However, Condorcet losers sometimes won under all voting rules. Thus, with sufficient pre-election information, plurality voting is not as subject to the Condorcet paradox as sincere voting suggests. However, neither approval voting nor Borda rule eliminate it as sincere voting suggests.

C. Duverger Effects

Under plurality voting, strategic voting can lead to Duverger's law as follows. Suppose voters somehow identify the front-running alternatives and cast votes likely to have the most impact for them (i.e., for their preferred front-runner).

If voters behave this way and agree on the front-runners, then these alternatives will receive the lion's share of the votes while other alternatives receive virtually none. Thus, this form of strategic voting results in a "bandwagon" effect with alternatives perceived early as strong drawing more votes and alternatives perceived early as weak drawing fewer votes. This effect can drive the votes received by the weaker alternatives to zero regardless of the number of voters who prefer these alternatives above all others.

In contrast, as long as some voters prefer each alternative to the others, strategic voting does not lead to similar effects under approval voting or Borda rule. Under both voting methods, not voting for a voter's first preference is dominated. Thus, while strategic voting may change various alternatives' vote totals and election outcomes, it should never drive any alternative's vote total to zero. Voters who prefer each alternative above all others will always cast some votes for it. Thus, we would not expect Duverger's law to arise under approval voting or Borda rule. In contrast, Model MW predicts close, three-way races as one of three possible equilibria under approval voting and the only equilibrium under Borda rule for Borda's example.

I will look at two measures to see whether Duverger's law arises in the experimental elections. Second and third place vote totals as fractions of the first place vote total show how close the elections were between the two leading alternatives and how viable the third alternative was. In addition, the number of elections in which one alternative received zero votes shows how often an alternative was literally driven out of an election.

Figure 6 shows the shows the average second and third place vote totals as fractions of the first place vote totals for data from FRM. The evidence for Duverger's law is strong in these repeated elections under plurality voting with (forced) bloc voting. The third-place alternatives never had average vote totals that approached the first place alternatives. Further, an alternative was driven out of an overwhelming number of the elections. Game 6, with a Condorcet cycle in the electorate's preferences, provides the only possible exception. As expected, Duverger's law seldom holds under approval voting. Both the second and third place vote totals rose as fractions of the first place totals. Further, alternatives received zero votes far less frequently than under plurality voting. Again, the possible exception is game 6 with its Condorcet cycle in preferences.

Insert Figure 6 about here.

While providing some evidence for and against Duverger's law, the FRM data do not provide the best testing ground for Duverger effects. Recall, that individuals cast votes for entire bloc. Thus, acting alone, an individual could expect an alternative to be inviable and, through not voting for that alternative, fulfill the expectation. In the FMRW1 and FMRW2 data, voters in a bloc could vote independently. Thus, to drive an alternative out of the race, all voters who might prefer that alternative must agree about that alternative's lack of viability and, hence, not vote for it.

Nevertheless, as Figure 7 shows, there is still strong evidence for Duverger's law under plurality voting with repeated elections, pre-election polls or both. In sessions PWOPS1, PWPS1 and CPSSP, the third place alternative generally received only a small fraction of the first place alternative's vote total. Also, the third place alternatives were often driven completely out of races. Session CPSS provides the plurality voting exception. Recall that, in these elections, majority voters had no shared election or poll histories to use as coordinating signals. The results under approval voting and Borda rule strongly suggest the predominance of close, three-way races.

Insert Figure 7 about here.

Thus, Duverger's law usually arises in the experimental elections under plurality voting. However, exceptions certainly arise in individual elections. The FRM data suggest that a Condorcet cycle in the electorate's preferences may promote exceptions to Duverger's law. The FMRW data suggest that Duverger's law arises as a result of a dynamic process of expectations formation and reactions. Exceptions often arise when an electorate has no election or poll history to create expectations. However, under exactly the same preferences, Duverger's law predominates when electorates have shared election or poll histories. FMRW2 discuss in detail how subjects appear to use their shared history in forming expectations and reacting in a manner that promotes Duverger's law.

D. The Prevalence of Sincere, Strategic and Dominated Voting

FRM and RFM define sincere, strategic and dominated voting as follows. List a voter's vote vector in order of votes for the voter's first, second and third preference. Then, sincere vote vectors are [1,0,0] under plurality voting and approval voting and [2,1,0] under Borda Rule. Strategic vote vectors are [0,1,0] under plurality voting, [1,1,0] under approval voting and [1,2,0] and [2,0,1] under Borda Rule. All other vote vectors are dominated. The definition for approval voting differs slightly from the traditional definition which would define both [1,0,0] and [1,1,0] as sincere. However, the distinction that FRM and RFM make allows us to distinguish between voters who vote for their first preference only and the "more strategic" voters who vote for both their first and second preferences.

Table VIII shows how often subjects who had the opportunity to cast all three vote vector types cast sincere strategic and dominated vote vectors.[9] Clearly, while voters often voted sincerely, they did not always do so. The percentages of strategic vote vectors cast ranged from 7.10% to 43.80% under plurality voting, from 15.40% to 57.55% under approval voting and from 21.35% to 25.78% under Borda rule. Though voters often voted strategically, they seldom cast dominated vote vectors in most sessions or games. Dominated voting never exceeded 5% in any of the FMRW1 and FMRW2 sessions. Nor did they ever exceed 5% under plurality voting in the FRM and RFM experiments. However, in the approval voting experiments of FRM and RFM, dominated voting ranged from 6.70% to 39.70% of the votes cast. They attribute this to approval voting's complexity and the subjects' lack of experience with it. However, since FMRW1 and FMRW2 do not contain similar increases in dominated voting under approval voting and Borda rule, the reason may be more complex.

Insert Table VIII about here.

E. Competitive Tests of Models

Given that voters vote as blocs (either naturally or by constraint), the FRM and RFM data provide competitive tests of the bloc voting models. The tests use the "del" statistic, ∇, based on work by Hildebrand, Laing and Rosenthal (1977) and discussed in Felsenthal (1990). To generate the statistic, first generate a cross table of observations by voters and vote vectors. Then generate an indicator variable, denoted w_{ij}, which takes on the value 0 if a model predicts that voter i may cast vote vector j and the value of 1 otherwise. The ∇ statistic is given by:

[9] In sessions run for FMRW1 and FMRW2, Type B voters could not cast strategic, but insincere vote vectors. These voters are not included in the statistics because they did not have the opportunity to vote "strategically" in the sense of casting a vote vector that differed from a sincere vector.

$$\nabla = 1 - \frac{\sum_i \sum_j w_{ij} p_{ij}}{\sum_i \sum_j w_{ij} p_{i\bullet} p_{\bullet j}}, \tag{3}$$

where p_{ij} is the frequency of vote vectors in cell (i,j) and $p_{i\bullet}$ and $p_{\bullet j}$ are the total frequencies in row i and column j, respectively. The range of ∇ is $(-\infty,1]$. If $\nabla=0$, then the variables are statistically independent. If $\nabla=1$, then no prediction errors occur. Thus, ∇'s can be used as measures of fit for the various models with positive ∇'s for models with some explanatory power and $\nabla=1$ for models that predict perfectly.

For both the FRM and RFM data, Figure 8 shows the ∇ values for Models S, F, NF, RFM without applying *Step 2* (consistent with the predictions in RFM) and RFM using *Step 2*. (Note that, as the statistics show, *Step 2* often reduces the predictions of Model RFM to those of Model S.) No clear pattern emerges. The models perform with varying degrees of success, all of them far from perfect. No model performs consistently better than the others. RFM conclude "that model RFM outperforms the other three models." However, they are referring to model RFM without *Step 2* on the RFM data only. As they point out "the success of model RFM is by no means unqualified." This is especially true when implementing their model with *Step 2* (often reducing the performance to that of Model S) and when either version is applied to the data in FRM. Thus, as explanatory models, no bloc voting model appears to stand out from the others.

Insert Figure 8 about here.

Though it would be inappropriate to apply Model MW to FRM and RFM's enforced bloc voting data, the bloc voting models can apply to the FMRW1 and FMRW2 data. FMRW1 and FMRW2 do not preclude bloc voting. Figure 9 shows the ∇ values for the FMRW1 and FMRW2 data. Since the experiments were not designed to distinguish between bloc voting models, predictions often match across models. However, when there are differences, Models S and RFM clearly perform the worst. Models F and MW are comparable and perform quite well for these particular payoffs.

Insert Figure 9 about here.

An analysis of how frequently voters of a given type voted as blocs can serve as an additional test distinguishing between bloc voting models and Model MW. Figure 10! shows the percentages of times that voters of a given type voted as a bloc in the FMRW1 and FMRW2 data. Clearly, voters of like preferences did not generally vote as blocs when not restricted to do so. The percentages of bloc voting range from 0% (BWOPS1, Type B voters) to 85.42% (CPSS, Type B voters).

Insert Figure 10! about here.

Two factors necessitate caution when using this test. First, if a given bloc of voters has a single undominated vote vector, they will all likely choose it and, thus, vote as a bloc regardless of whether they reason as a bloc or individualistically. For example, Type B voters have only one undominated vote vector under approval and plurality voting. Consistent with this, Type B voters voted as a bloc much more often under approval and plurality voting (from

41.66% to 85.42% of the time) than under Borda Rule (from 0% to 6.25% of the time).

Second, the process of attaining equilibrium under the MW model may result in apparent bloc voting. In their plurality voting elections, all voter types will vote as blocs in each equilibrium if they come to expect that equilibrium. (There are three equilibria, one in which Type O and G voters all vote for their preferred alternatives and two in which they all vote for one of these alternatives while the other receives zero votes.) Thus, if voters vote consistently with a single equilibrium, we would observe "bloc" voting in spite of the possibility that they arrived at the equilibrium through individualistic reasoning. Thus, we should observe non-bloc voting only until voters within a bloc agree on the expected equilibrium. Again, the evidence is consistent with this. In plurality voting sessions with history (PWOPS1, PWPS1 and CPSSP), Type O and G voters tended to vote as blocs (from 54.17% to 62.50% of the time). In contrast, without history to serve as a coordinating signal (session CPSS), Type O and G voters voted as blocs only 7.29% of the time. Type O and G voters also seldom voted as blocs under approval voting and Borda rule (from 8.33% to 33.33% of the time). This is consistent with Model MW, which predicts mixed strategies for Type O and G voters in one of the three equilibria under approval voting and in the unique equilibrium under Borda Rule.

F. Equilibrium Selection

Models F, NF and RFM often give indeterminate outcomes while giving no guidance in resolving these indeterminacies. Because the FRM and RFM experiments were not designed to examine such issues, the data do not provide much evidence on how voters actually resolve indeterminacies. However, it does appear that the preference structure may help determine how voters vote. Condorcet winners were more likely to win than other alternatives.

Model MW also often results in a type of indeterminacy because it often predicts multiple equilibria. For example, there are three plurality voting equilibria under FMRW1 and FMRW2's symmetric payoff schedule. In one, all voters vote for their preferred alternatives and Blue wins with 6 votes to Orange and Green's 4 each. In the other, all Type O and G voters coordinate on one of their preferred alternatives and that alternative wins by 8 votes to Blue's 6. However, MW propose that nearly any public signal could help resolve indeterminacies. Possibilities could include ques from the preference structure (such a Condorcet rankings) or other public signals (such as polls, endorsements, media focus, advertising, etc.) FMRW2 demonstrate convincingly how voters can use prior events such as previous elections and polls for equilibrium selection.

Table IX% shows clearly how voters arrived at equilibria in the FMRW1 and FMRW2 elections under plurality voting. Type O and G voters overwhelmingly voted for whichever of their preferred alternatives led in whatever event (poll or election) immediately preceded the current election. When no previous event existed or the event did not differentiate these alternatives, Type O and G voters had trouble coordinating their votes and the Condorcet loser typically won elections.

Insert Table IX% about here.

Polls alone served as excellent coordinating signals. In sessions with one election per group (CPSS and CPSSP), polls significantly reduced the likelihood that the Condorcet loser (Blue) would win (from 87.50% of the elections without polls to 33.33% of the elections with polls). Differentiation between Orange and Green in a poll also significantly reduced the likelihood that the Condorcet loser would win (from 90.91% of the elections following a poll in which Orange and Green tied to 16.22% of the elections after polls in which one of these alternatives led the other). After leading Green in the poll, Orange won 87.50% of the elections. Green won none. After leading Orange in the poll, Green won 76.92% of the elections. Orange won none. Thus, poll leads helped Type O and G voters to coordinate on one of the equilibria in which the Condorcet loser lost.

In sessions with repeated elections (PWOPS1 and PWPS1), the Condorcet loser also won a relatively small fraction of the elections. While Type O and G voters usually managed to coordinate their support behind one of their preferred alternatives, polls significantly affected how they coordinated. In PWOPS1, Type O and G voters typically coordinated their support behind whichever of their preferred alternatives led in the preceding election. Thus, whichever of Orange and Green was ahead of the other in early elections typically won the later elections, while the other was driven out. Indeed, there were no groups in which both Orange and Green won elections. In elections which alternated with polls (PWPS1), Type O and G voters overwhelmingly voted for whichever of their preferred alternatives led in the preceding poll. However, in the post-first-round polls, they tended to poll for the alternative that was *behind* in the preceding election. The polls apparently provided an inexpensive way for supporters of the losing alternative in one election to "request" consideration in the next election and for the supporters of the previous winner to signal their willingness to grant such consideration. Both Orange and Green won at least one election in every group but one.

IV. Conclusions

Few argue about the importance of the effects of strategic voting if it does occur. Work dating back at least to Laplace (1812) convincingly shows how strategic voting can effect elections, changing outcomes and leading to such universally accepted principles as Duverger's law.

While they agree on its potential importance, writers debate whether strategic voting actually occurs. Some argue that strategic voting is a universal phenomenon. Riker (1982, p. 141) states, "Given an appropriate profile of preferences, any voting method can be manipulated strategically. That is, assuming there are 'true' preference orders for voters, then there are occasions on which some voters can achieve a desired outcome by voting contrary to their true preferences." This is a direct consequence of Arrow (1963). Others disagree, minimizing the importance of strategic voting. As Riker (1982, p. 145) puts it, "Some writers have suggested that strategic voting is so difficult for most people that very little of it occurs."

Politicians recognize this debate. Perhaps their recognition has never been more clear than in the 1970 New York Senate race between James Buckley, Charles Goodell and Richard Ottinger (an election in which the likely Condorcet loser (Buckley) won according to Riker (1982)). Recognizing the possibilities of strategic voting, Ottinger supporters tried to encourage it by taking out a full page advertisement in the November 1, 1970 New York Times asking "moderates, independents and progressives [to] unite" (i.e. vote strategically) because "if you don't vote for Ottinger, Buckley will be your senator." Hoping that sincere voting would elect him, Goodell supporters tried explicitly to discourage strategic voting. An advertisement the next day stated: "There are still more people who will vote for a man they really want than a man they are frightened into choosing....And if you have any lingering doubts that you'll be voting for a loser, let this thought reassure you. If the people of New York show as much courage for him as he's shown, Senator Goodell can't lose."

Though the debate is lively, conclusive evidence about the existence of strategic voting or about how voters arrive at their voting strategies has been virtually unattainable. Riker (1982, p. 145) points out the difficulty stating: "Evidence for or against this proposition is hard to come by because to know whether people vote strategically, one must know how their true values differ (if at all) from the values they reveal. The observer knows for certain only what is revealed, so half of the data for comparison are unavailable." To make statements about the nature of and results of strategic voting in naturally occurring elections, we must hazard guesses about the electorate's "true" preferences.

Experiments, such as those reviewed here, provide a unique opportunity to study strategic voting. The controlled environments allow us to study voter behavior and compare it to voters' "true" (cash induced) preferences. Experimental elections may be the only viable testing grounds for models of strategic voting. They provide a distinctive opportunity to learn about how voters actually decide upon their strategies and how strategic voting affects election outcomes.

What voting rule is "best" remains an open question and much remains to be explored. However, through experiments, we have already learned a great deal about strategic voting and its consequences. The experimental evidence reviewed here suggest the following conclusions.

Borda's fears can be realized. Condorcet losers won some elections in all of the experiments. They won an overwhelming number of the elections that most closely matched Borda's example: electorates with a split-majority participating in a single election with no information about the probable voting behavior of others. However, through strategic voting, voters usually managed to defeat Condorcet losers. Voters in repeated elections learned surprisingly quickly how to coordinate strategic votes to defeat Condorcet losers and foster Condorcet winners. Voters who commonly knew a non-binding, pre-election poll outcome also generally managed to defeat Condorcet losers. Thus, while not automatic, a dynamic process of strategic voting usually allays Borda's fears.

Duverger's law generally held under plurality voting. One alternative was generally driven out of the three alternative elections. However, exceptions often arose in precisely the same elections that realized Borda's fears: electorates with a split-majority participating in a single election with no information about the probable voting behavior of others. Exceptions also arose for electorates with Condorcet cycles in preferences. In these elections, voters had trouble forming stable coalitions with stable strategies. However, in other repeated elections or elections following polls, the electorates quickly focused on the leading alternatives, casting the majority of votes for them while casting few for the third-place alternative. Thus again, while not automatic, Duverger's law usually resulted from a dynamic process of strategic voting.

Voters seldom cast dominated vote vectors. Neither did they always vote sincerely. At least in these relatively small electorates, voters clearly voted strategically with enough information. Similarly, when choosing between multiple un-dominated vote vectors in these elections, voters clearly did not vote as blocs when not restricted to do so. This calls into question both assumptions of sincere and bloc voting in descriptive models of voter choice.

When voters were restricted to voting as blocs, the bloc voting models perform with varying degrees of success, all of them far from perfect. When bloc voting was not enforced, Myerson and Weber's (1993) model appears most consistent with the data overall. Voter's generally cast vote vectors consistent with this model. Also consistent with the model, when voters were not restricted to vote as blocs, they often did not and may have used mixed strategies. The model also performed well according to statistical measures of predictive power. Finally, as suggested by Myerson and Weber (1993), voters appeared to use publicly available information from previous elections and polls to form expectations and vote accordingly.

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Table I: Electorate Demographics, Vote Distributions and Election Winners
Felsenthal, Rapoport and Maoz (1988), Experiment 1 (Plurality Voting)

Game 1. Condorcet Ranking: $a \sim b \succ c$. Sincere Vote Total Ranking: $a = b > c$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	3	1	.5	0	.950	.050	.000	--	--	--	--	.950	.050	.000
B	1	3	1	0	.5	.900	.050	.050	--	--	--	--	.900	.050	.050
C	1	3	0	1	.5	.133	.817	.050	--	--	--	--	.817	.050	.133
D	1	3	.5	1	0	.133	.867	.000	--	--	--	--	.867	.133	.000
Overall Vote Fractions:						.529	.446	.025	--	--	--	--	.883	.071	.046
Fractions of Elections Won:						.217	.150	.000	.633	.000	.000	.000	--	--	--

Game 2. Condorcet Ranking: $b \succ a \succ c$. Sincere Vote Total Ranking: $b > c > a$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	2	1	0	.5	.233	.100	.667	--	--	--	--	.233	.667	.100
B	1	2	0	1	.5	.000	.917	.083	--	--	--	--	.917	.083	.000
C	1	8	.5	1	0	.017	.983	.000	--	--	--	--	.983	.017	.000
D	1	5	0	.5	1	.000	.350	.650	--	--	--	--	.650	.350	.000
Overall Vote Fractions:						.063	.588	.350	--	--	--	--	.696	.279	.025
Fractions of Elections Won:						.017	.917	.067	.000	.000	.000	.000	--	--	--

Game 3. Condorcet Ranking: $c \succ b \succ a$. Sincere Vote Total Ranking: $b = c > a$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	3	1	0	.5	.100	.000	.900	--	--	--	--	.100	.900	.000
B	1	4	0	1	.5	.000	.267	.733	--	--	--	--	.267	.733	.000
C	1	2	.5	0	1	.100	.000	.900	--	--	--	--	.900	.100	.000
D	1	2	0	.5	1	.000	.017	.983	--	--	--	--	.983	.017	.000
Overall Vote Fractions:						.050	.071	.879	--	--	--	--	.563	.438	.000
Fractions of Elections Won:						.017	.017	.967	.000	.000	.000	.000	--	--	--

Game 4. Condorcet Ranking: $c \succ a \succ b$. Sincere Vote Total Ranking: $b > a = c$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	6	1	0	.5	.233	.000	.767	--	--	--	--	.233	.767	.000
B	1	7	0	1	.5	.000	.250	.750	--	--	--	--	.250	.750	.000
C	1	4	.5	0	1	.117	.000	.883	--	--	--	--	.883	.117	.000
D	1	2	0	.5	1	.017	.017	.967	--	--	--	--	.967	.017	.017
Overall Vote Fractions:						.092	.067	.842	--	--	--	--	.583	.413	.004
Fractions of Elections Won:						.067	.050	.883	.000	.000	.000	.000	--	--	--

Game 5. Condorcet Ranking: $a \succ b \succ c \succ a$ (Cycle). Sincere Vote Total Ranking: $b > a = c$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	6	1	.5	0	.267	.717	.017	--	--	--	--	.267	.717	.017
B	1	7	0	1	.5	.000	.733	.267	--	--	--	--	.733	.267	.000
C	1	4	.5	0	1	.217	.033	.750	--	--	--	--	.750	.217	.033
D	1	2	0	.5	1	.000	.200	.800	--	--	--	--	.800	.200	.000
Overall Vote Fractions:						.121	.421	.458	--	--	--	--	.638	.350	.013
Fractions of Elections Won:						.100	.667	.233	.000	.000	.000	.000	--	--	--

Game 6. Condorcet Ranking: $a \succ b \succ c \succ a$ (Cycle). Sincere Vote Total Ranking: $a = b > c$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	4	0	1	.5	.033	.350	.617	--	--	--	--	.350	.617	.033
B	1	2	1	0	.5	.733	.033	.233	--	--	--	--	.733	.233	.033
C	1	2	1	.5	0	.633	.317	.050	--	--	--	--	.633	.317	.050
D	1	3	.5	0	1	.367	.000	.633	--	--	--	--	.633	.367	.000
Overall Vote Fractions:						.442	.175	.383	--	--	--	--	.588	.383	.029
Fractions of Elections Won:						.300	.100	.500	.100	.000	.000	.000	--	--	--

Table I: Electorate Demographics, Vote Distributions and Election Winners
Felsenthal, Rapoport and Maoz (1988), Experiment 1 (Plurality Voting)

Game 7. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: b>a=c.

		Votes Vectors	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	7	.5	1	0	.617	.383	.000	--	--	--	--	.383	.617	.000
B	1	4	1	0	.5	.833	.017	.150	--	--	--	--	.833	.150	.017
C	1	6	.5	0	1	.667	.033	.300	--	--	--	--	.300	.667	.033
D	1	2	1	.5	0	.883	.100	.017	--	--	--	--	.883	.100	.017
Overall Vote Fractions:						.750	.133	.117	--	--	--	--	.600	.383	.017
Fractions of Elections Won:						.800	.133	.067	.000	.000	.000	.000	--	--	--

*Number of Israeli Shekels received conditional on election winner.
†Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table II: Electorate Demographics, Vote Distributions and Election Winners
Felsenthal, Rapoport and Maoz (1988), Experiment 2 (Approval Voting)

Game 1. Condorcet Ranking: a~b≻c. Sincere Vote Total Ranking: a=b>c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	3	1	.5	0	.717	.000	.000	.200	.033	.017	.033	.717	.200	.083
B	1	3	1	0	.5	.600	.067	.033	.033	.267	.000	.000	.600	.267	.133
C	1	3	0	1	.5	.000	.650	.017	.050	.000	.267	.017	.650	.267	.083
D	1	3	.5	1	0	.133	.683	.017	.117	.000	.050	.000	.683	.117	.200
Overall Vote Fractions:						.363	.350	.017	.100	.075	.083	.013	.663	.213	.125
Fractions of Elections Won:						.250	.233	.017	.467	.033	.000	.000	--	--	--

Game 2. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: b=c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	3	1	0	.5	.417	.033	.067	.017	.400	.033	.033	.417	.400	.183
B	1	4	0	1	.5	.017	.217	.300	.000	.000	.450	.017	.217	.450	.333
C	1	2	.5	0	1	.000	.000	.550	.000	.383	.067	.000	.550	.383	.067
D	1	2	0	.5	1	.083	.033	.650	.017	.067	.150	.000	.650	.150	.200
Overall Vote Fractions:						.129	.071	.392	.008	.213	.175	.013	.458	.346	.196
Fractions of Elections Won:						.067	.017	.850	.000	.017	.050	.000	--	--	--

Game 3. Condorcet Ranking: b≻a≻c. Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	2	1	0	.5	.133	.017	.067	.000	.700	.000	.083	.133	.700	.167
B	1	2	0	1	.5	.000	.650	.000	.017	.000	.333	.000	.650	.333	.017
C	1	8	.5	1	0	.000	.933	.017	.050	.000	.000	.000	.933	.050	.017
D	1	5	0	.5	1	.000	.083	.483	.000	.033	.383	.017	.483	.383	.133
Overall Vote Fractions:						.033	.421	.142	.017	.183	.179	.025	.550	.367	.083
Fractions of Elections Won:						.000	.967	.017	.017	.000	.000	.000	--	--	--

Game 4. Condorcet Ranking: c≻a≻b. Sincere Vote Total Ranking: b>a=c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	6	1	0	.5	.350	.000	.100	.017	.517	.000	.017	.350	.517	.133
B	1	7	0	1	.5	.000	.467	.133	.000	.000	.400	.000	.467	.400	.133
C	1	4	.5	0	1	.000	.000	.633	.000	.367	.000	.000	.633	.367	.000
D	1	2	0	.5	1	.000	.017	.483	.000	.000	.500	.000	.483	.500	.017
Overall Vote Fractions:						.088	.121	.338	.004	.221	.225	.004	.483	.446	.071
Fractions of Elections Won:						.083	.133	.767	.000	.017	.000	.000	--	--	--

Game 5. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: b>a=c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	7	.5	1	0	.033	.333	.000	.600	.017	.000	.017	.333	.600	.067
B	1	4	1	0	.5	.500	.000	.000	.000	.483	.017	.000	.500	.483	.017
C	1	6	.5	0	1	.083	.000	.367	.000	.550	.000	.000	.367	.550	.083
D	1	2	1	.5	0	.650	.100	.000	.250	.000	.000	.000	.650	.250	.100
Overall Vote Fractions:						.317	.108	.092	.213	.263	.004	.004	.463	.471	.067
Fractions of Elections Won:						.833	.017	.100	.000	.050	.000	.000	--	--	--

Game 6. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: c>b>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	6	0	.5	1	.000	.050	.733	.117	.000	.100	.000	.733	.100	.167
B	1	7	0	1	.5	.000	.733	.067	.033	.000	.167	.000	.733	.167	.100
C	1	4	.5	0	1	.000	.000	.717	.000	.283	.000	.000	.717	.283	.000
D	1	2	0	.5	1	.000	.000	.933	.000	.000	.067	.000	.933	.067	.000
Overall Vote Fractions:						.000	.196	.613	.038	.071	.083	.000	.779	.154	.067
Fractions of Elections Won:						.000	.250	.733	.000	.000	.017	.000	--	--	--

Table II: Electorate Demographics, Vote Distributions and Election Winners
Felsenthal, Rapoport and Maoz (1988), Experiment 2 (Approval Voting)

Game 7. Condorcet Ranking: a≻b≻c≻a (Cycle). Sincere Vote Total Ranking: b>a>c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	7	1	.5	0	.383	.067	.033	.500	.017	.000	.000	.383	.500	.117
B	1	8	0	1	.5	.000	.500	.017	.000	.000	.483	.000	.500	.483	.017
C	1	5	.5	0	1	.100	.000	.300	.000	.600	.000	.000	.300	.600	.100
D	1	1	0	.5	1	.000	.033	.717	.000	.017	.233	.000	.717	.233	.050
Overall Vote Fractions:						.121	.150	.267	.125	.158	.179	.000	.475	.454	.071
Fractions of Elections Won:						.167	.633	.200	.000	.000	.000	.000	--	--	--

*Number of Israeli Shekels received conditional on election winner.
†Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table III: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 1 (Plurality Voting)

Game 1. Condorcet Ranking: c≻a≻b. Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	18	1	0	.5	.250	.083	.667	--	--	--	--	.250	.667	.083
B	1	7	0	.5	1	.000	.200	.800	--	--	--	--	.800	.200	.000
C	1	21	0	1	.5	.017	.583	.400	--	--	--	--	.583	.400	.017
D	1	1	1	.5	0	.417	.550	.033	--	--	--	--	.417	.550	.033
E	1	13	.5	0	1	.233	.067	.700	--	--	--	--	.700	.233	.067
		Overall Vote Fractions:				.183	.297	.520	--	--	--	--	.550	.410	.040
		Fractions of Elections Won:				.050	.267	.667	.000	.000	.017	.000	--	--	--

Game 2. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: c>b>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.617	.300	.083	--	--	--	--	.617	.300	.083
B	1	20	.5	1	0	.683	.283	.033	--	--	--	--	.283	.683	.033
C	1	13	1	0	.5	.850	.017	.133	--	--	--	--	.850	.133	.017
D	1	18	.5	0	1	.200	.000	.800	--	--	--	--	.800	.200	.000
E	1	8	0	.5	1	.067	.300	.633	--	--	--	--	.633	.300	.067
		Overall Vote Fractions:				.483	.180	.337	--	--	--	--	.637	.323	.040
		Fractions of Elections Won:				.717	.050	.233	.000	.000	.000	.000	--	--	--

Game 3. Condorcet Ranking: a≻b≻c≻a (Cycle). Sincere Vote Total Ranking: a>b>c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	11	.5	0	1	.250	.050	.700	--	--	--	--	.700	.250	.050
B	1	8	1	0	.5	.700	.017	.283	--	--	--	--	.700	.283	.017
C	1	18	0	1	.5	.083	.600	.317	--	--	--	--	.600	.317	.083
D	1	14	1	.5	0	.700	.283	.017	--	--	--	--	.700	.283	.017
E	1	3	0	.5	1	.017	.267	.717	--	--	--	--	.717	.267	.017
		Overall Vote Fractions:				.350	.243	.407	--	--	--	--	.683	.280	.037
		Fractions of Elections Won:				.433	.267	.300	.000	.000	.000	.000	--	--	--

Game 4. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: a>c>b.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	19	0	1	.5	.033	.250	.717	--	--	--	--	.250	.717	.033
B	1	3	.5	0	1	.033	.000	.967	--	--	--	--	.967	.033	.000
C	1	1	1	.5	0	.633	.317	.050	--	--	--	--	.633	.317	.050
D	1	20	1	0	.5	.517	.000	.483	--	--	--	--	.517	.483	.000
E	1	17	0	.5	1	.017	.050	.933	--	--	--	--	.933	.050	.017
		Overall Vote Fractions:				.247	.123	.630	--	--	--	--	.660	.320	.020
		Fractions of Elections Won:				.067	.050	.883	.000	.000	.000	.000	--	--	--

Game 5. Condorcet Ranking: c≻a≻b. Sincere Vote Total Ranking: b=c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated

Table III: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 1 (Plurality Voting)

A	1	1	1	.5	0	.283	.500	.217	--	--	--	--	.283	.500	.217
B	1	17	1	0	.5	.333	.000	.667	--	--	--	--	.333	.667	.000
C	1	21	0	1	.5	.000	.467	.533	--	--	--	--	.467	.533	.000
D	1	14	.5	0	1	.117	.000	.883	--	--	--	--	.883	.117	.000
E	1	7	0	.5	1	.000	.067	.933	--	--	--	--	.933	.067	.000
Overall Vote Fractions:						.147	.207	.647	--	--	--	--	.580	.377	.043
Fractions of Elections Won:						.100	.100	.783	.000	.000	.017	.000	--	--	--

Game 6. Condorcet Ranking: $c \succ a \succ b$. Sincere Vote Total Ranking: $a > c > b$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	10	.5	0	1	.067	.117	.817	--	--	--	--	.817	.067	.117
B	1	10	0	.5	1	.000	.117	.883	--	--	--	--	.883	.117	.000
C	1	3	1	.5	0	.700	.300	.000	--	--	--	--	.700	.300	.000
D	1	18	1	0	.5	.683	.000	.317	--	--	--	--	.683	.317	.000
E	1	19	0	1	.5	.000	.283	.717	--	--	--	--	.283	.717	.000
Overall Vote Fractions:						.290	.163	.547	--	--	--	--	.673	.303	.023
Fractions of Elections Won:						.200	.050	.750	.000	.000	.000	.000	--	--	--

Game 7. Condorcet Ranking: $c \succ a \sim b$. Sincere Vote Total Ranking: $b > c > a$.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	13	.5	0	1	.133	.017	.850	--	--	--	--	.850	.133	.017
B	1	8	.5	1	0	.333	.633	.033	--	--	--	--	.633	.333	.033
C	1	14	0	1	.5	.000	.783	.217	--	--	--	--	.783	.217	.000
D	1	17	1	0	.5	.450	.000	.550	--	--	--	--	.450	.550	.000
E	1	8	0	.5	1	.000	.150	.850	--	--	--	--	.850	.150	.000
Overall Vote Fractions:						.183	.317	.500	--	--	--	--	.713	.277	.010
Fractions of Elections Won:						.083	.150	.683	.050	.000	.033	.000	--	--	--

[*] Number of Israeli Shekels received conditional on election winner.
[†] Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table IV: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 2 (Plurality Voting)

Game 1. Condorcet Ranking: a~b≻c. Sincere Vote Total Ranking: a>b>c.

		Votes Vectors	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	10	1	.5	0	.867	.117	.017	--	--	--	--	.867	.117	.017
B	1	5	1	0	.5	.900	.050	.050	--	--	--	--	.900	.050	.050
C	1	10	.5	1	0	.417	.567	.017	--	--	--	--	.567	.417	.017
D	1	4	0	1	.5	.100	.650	.250	--	--	--	--	.650	.250	.100
E	1	5	.5	0	1	.650	.017	.333	--	--	--	--	.333	.650	.017
F	1	6	0	.5	1	.067	.583	.350	--	--	--	--	.350	.583	.067
Overall Vote Fractions:						.500	.331	.169	--	--	--	--	.611	.344	.044
Fractions of Elections Won:						.617	.250	.033	.100	.000	.000	.000	--	--	--

Game 2. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: c>b>a.

		Votes Vectors	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.683	.267	.050	--	--	--	--	.683	.267	.050
B	1	13	1	0	.5	.567	.000	.433	--	--	--	--	.567	.433	.000
C	1	19	.5	1	0	.567	.333	.100	--	--	--	--	.333	.567	.100
D	1	1	0	1	.5	.000	.400	.600	--	--	--	--	.400	.600	.000
E	1	18	.5	0	1	.217	.000	.783	--	--	--	--	.783	.217	.000
F	1	8	0	.5	1	.033	.150	.817	--	--	--	--	.817	.150	.033
Overall Vote Fractions:						.344	.192	.464	--	--	--	--	.597	.372	.031
Fractions of Elections Won:						.450	.033	.500	.017	.000	.000	.000	--	--	--

Game 3. Condorcet Ranking: c≻a~b. Sincere Vote Total Ranking: b>c>a.

		Votes Vectors	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.733	.250	.017	--	--	--	--	.733	.250	.017
B	1	16	1	0	.5	.683	.017	.300	--	--	--	--	.683	.300	.017
C	1	8	.5	1	0	.367	.583	.050	--	--	--	--	.583	.367	.050
D	1	14	0	1	.5	.017	.500	.483	--	--	--	--	.500	.483	.017
E	1	13	.5	0	1	.283	.017	.700	--	--	--	--	.700	.283	.017
F	1	8	0	.5	1	.000	.250	.750	--	--	--	--	.750	.250	.000
Overall Vote Fractions:						.347	.269	.383	--	--	--	--	.658	.322	.019
Fractions of Elections Won:						.200	.183	.550	.000	.000	.067	.000	--	--	--

Game 4. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: b=c>a.

		Votes Vectors	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.733	.267	.000	--	--	--	--	.733	.267	.000
B	1	3	1	0	.5	.583	.000	.417	--	--	--	--	.583	.417	.000
C	1	27	.5	1	0	.500	.500	.000	--	--	--	--	.500	.500	.000
D	1	1	0	1	.5	.017	.533	.450	--	--	--	--	.533	.450	.017
E	1	27	.5	0	1	.217	.000	.783	--	--	--	--	.783	.217	.000
F	1	1	0	.5	1	.000	.167	.833	--	--	--	--	.833	.167	.000
Overall Vote Fractions:						.342	.244	.414	--	--	--	--	.661	.336	.003
Fractions of Elections Won:						.450	.067	.417	.017	.000	.050	.000	--	--	--

Game 5. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: c>a>b.

		Votes Vectors	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
Voter Type	No. of Voters	per Voter	a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	6	1	.5	0	.917	.083	.000	--	--	--	--	.917	.083	.000
B	1	4	1	0	.5	.867	.000	.133	--	--	--	--	.867	.133	.000
C	1	5	.5	1	0	.667	.333	.000	--	--	--	--	.333	.667	.000
D	1	1	0	1	.5	.083	.500	.417	--	--	--	--	.500	.417	.083
E	1	5	.5	0	1	.267	.000	.733	--	--	--	--	.733	.267	.000
F	1	6	0	.5	1	.000	.300	.700	--	--	--	--	.700	.300	.000

Table IV: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 2 (Plurality Voting)

						a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
		Overall Vote Fractions:				.467	.203	.331	--	--	--	--	.675	.311	.014
		Fractions of Elections Won:				.683	.067	.233	.000	.000	.017	.000	--	--	--

Game 6. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.700	.300	.000	--	--	--	--	.700	.300	.000
B	1	14	1	0	.5	.550	.000	.450	--	--	--	--	.550	.450	.000
C	1	14	.5	1	0	.333	.667	.000	--	--	--	--	.667	.333	.000
D	1	9	0	1	.5	.033	.600	.367	--	--	--	--	.600	.367	.033
E	1	9	.5	0	1	.117	.000	.883	--	--	--	--	.883	.117	.000
F	1	13	0	.5	1	.000	.100	.900	--	--	--	--	.900	.100	.000
		Overall Vote Fractions:				.289	.278	.433	--	--	--	--	.717	.278	.006
		Fractions of Elections Won:				.100	.233	.667	.000	.000	.000	.000	--	--	--

Game 7. Condorcet Ranking: a≻b≻c≻a (Cycle). Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	4	1	.5	0	.533	.467	.000	--	--	--	--	.533	.467	.000
B	1	1	1	0	.5	.650	.000	.350	--	--	--	--	.650	.350	.000
C	1	1	.5	1	0	.083	.917	.000	--	--	--	--	.917	.083	.000
D	1	7	0	1	.5	.033	.517	.450	--	--	--	--	.517	.450	.033
E	1	5	.5	0	1	.433	.000	.567	--	--	--	--	.567	.433	.000
F	1	1	0	.5	1	.000	.333	.667	--	--	--	--	.667	.333	.000
		Overall Vote Fractions:				.289	.372	.339	--	--	--	--	.642	.353	.006
		Fractions of Elections Won:				.383	.300	.267	.050	.000	.000	.000	--	--	--

Game 8. Condorcet Ranking: a~b≻c≻a (Cycle). Sincere Vote Total Ranking: b>a>c.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	4	1	.5	0	.717	.283	.000	--	--	--	--	.717	.283	.000
B	1	2	1	0	.5	.917	.000	.083	--	--	--	--	.917	.083	.000
C	1	1	.5	1	0	.067	.933	.000	--	--	--	--	.933	.067	.000
D	1	8	0	1	.5	.017	.817	.167	--	--	--	--	.817	.167	.017
E	1	4	.5	0	1	.750	.000	.250	--	--	--	--	.250	.750	.000
F	1	1	0	.5	1	.000	.617	.383	--	--	--	--	.383	.617	.000
		Overall Vote Fractions:				.411	.442	.147	--	--	--	--	.669	.328	.003
		Fractions of Elections Won:				.117	.317	.117	.450	.000	.000	.000	--	--	--

*Number of Israeli Shekels received conditional on election winner.
†Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table V: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 3 (Approval Voting)

Game 1. Condorcet Ranking: a≻c≻b. Sincere Vote Total Ranking: c>b>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	28	.5	0	1	.100	.017	.650	.017	.150	.067	.000	.650	.150	.200
B	1	3	1	0	.5	.317	.050	.000	.433	.167	.033	.000	.317	.167	.517
C	1	27	.5	1	0	.283	.083	.067	.283	.233	.050	.000	.083	.283	.633
D	1	1	0	.5	1	.050	.017	.350	.000	.117	.450	.017	.350	.450	.200
E	1	1	1	.5	0	.367	.033	.017	.450	.117	.017	.000	.367	.450	.183
Overall Vote Fractions:						.223	.040	.217	.237	.157	.123	.003	.353	.300	.347
Fractions of Elections Won:						.550	.117	.283	.000	.050	.000	.000	--	--	--

Game 2. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	16	.5	0	1	.117	.117	.333	.233	.183	.017	.000	.333	.183	.483
B	1	11	1	0	.5	.217	.000	.133	.000	.650	.000	.000	.217	.650	.133
C	1	5	0	.5	1	.000	.050	.450	.033	.050	.417	.000	.450	.417	.133
D	1	2	1	.5	0	.067	.033	.233	.317	.283	.067	.000	.067	.317	.617
E	1	26	0	1	.5	.050	.333	.083	.033	.050	.450	.000	.333	.450	.217
Overall Vote Fractions:						.090	.107	.247	.123	.243	.190	.000	.280	.403	.317
Fractions of Elections Won:						.117	.183	.700	.000	.000	.000	.000	--	--	--

Game 3. Condorcet Ranking: c≻b≻a. Sincere Vote Total Ranking: c>b>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	5	0	.5	1	.000	.000	.850	.000	.050	.100	.000	.850	.050	.100
B	1	22	.5	0	1	.000	.000	.600	.000	.400	.000	.000	.600	.400	.000
C	1	26	0	1	.5	.000	.467	.100	.033	.100	.300	.000	.467	.300	.233
D	1	5	1	0	.5	.033	.000	.333	.000	.633	.000	.000	.033	.633	.333
E	1	2	1	.5	0	.217	.033	.083	.617	.050	.000	.000	.217	.617	.167
Overall Vote Fractions:						.050	.100	.393	.130	.247	.080	.000	.433	.400	.167
Fractions of Elections Won:						.050	.017	.933	.000	.000	.000	.000	--	--	--

Game 4. Condorcet Ranking: c≻a≻b. Sincere Vote Total Ranking: b=c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	1	1	.5	0	.300	.117	.083	.450	.000	.050	.000	.300	.450	.250
B	1	21	0	1	.5	.017	.183	.250	.000	.017	.533	.000	.183	.533	.283
C	1	17	1	0	.5	.433	.000	.017	.000	.533	.017	.000	.433	.533	.033
D	1	7	0	.5	1	.000	.133	.183	.000	.017	.667	.000	.183	.667	.150
E	1	14	.5	0	1	.117	.000	.333	.000	.533	.017	.000	.333	.533	.133
Overall Vote Fractions:						.173	.087	.173	.090	.220	.257	.000	.287	.543	.170
Fractions of Elections Won:						.183	.017	.800	.000	.000	.000	.000	--	--	--Game 5. Condorcet Ranking: b≻a≻c. Sincere Vote Total Ranking: a>c>b.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated

Table V: Electorate Demographics, Vote Distributions and Election Winners
Rapoport, Felsenthal and Maoz (1991), Experiment 3 (Approval Voting)

A	1	18	1	.5	0	.667	.083	.017	.183	.000	.050	.000	.667	.183	.150
B	1	13	0	.5	1	.000	.300	.117	.050	.000	.533	.000	.117	.533	.350
C	1	8	.5	1	0	.100	.283	.167	.133	.167	.133	.017	.283	.133	.583
D	1	6	0	1	.5	.017	.400	.050	.300	.017	.217	.000	.400	.217	.383
E	1	2	.5	0	1	.133	.100	.183	.050	.300	.233	.000	.183	.300	.517
Overall Vote Fractions:						.183	.233	.107	.143	.097	.233	.003	.330	.273	.397
Fractions of Elections Won:						.250	.617	.133	.000	.000	.000	.000	--	--	--

Game 6. Condorcet Ranking: a≻b≻c≻a (Cycle). Sincere Vote Total Ranking: a>c>b.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	8	1	0	.5	.583	.033	.000	.017	.317	.050	.000	.583	.317	.100
B	1	11	.5	0	1	.150	.000	.383	.000	.467	.000	.000	.383	.467	.150
C	1	14	1	.5	0	.300	.000	.000	.633	.050	.017	.000	.300	.633	.067
D	1	14	0	1	.5	.000	.250	.000	.050	.000	.700	.000	.250	.700	.050
E	1	4	0	.5	1	.083	.000	.217	.000	.050	.650	.000	.217	.650	.133
Overall Vote Fractions:						.223	.057	.120	.140	.177	.283	.000	.347	.553	.100
Fractions of Elections Won:						.467	.200	.333	.000	.000	.000	.000	--	--	--

Game 7. Condorcet Ranking: c≻a~b. Sincere Vote Total Ranking: b>c>a.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule[*]			Observed Voting and Winning Fractions[†] (60 Observations per Voter Type)							Frequency of Votes by Type (60 Observations per Voter Type)		
			a	b	c	a	b	c	ab	ac	bc	abc	Sincere	Strategic	Dominated
A	1	14	0	1	.5	.033	.517	.050	.000	.067	.333	.000	.517	.333	.150
B	1	17	1	0	.5	.417	.000	.167	.000	.417	.000	.000	.417	.417	.167
C	1	8	.5	1	0	.050	.200	.017	.583	.050	.050	.050	.200	.583	.217
D	1	8	0	.5	1	.000	.033	.350	.000	.000	.617	.000	.350	.617	.033
E	1	13	.5	0	1	.000	.000	.650	.000	.350	.000	.000	.650	.350	.000
Overall Vote Fractions:						.100	.150	.247	.117	.177	.200	.010	.427	.460	.113
Fractions of Elections Won:						.200	.050	.700	.000	.033	.017	.000	--	--	--

[*]Number of Israeli Shekels received conditional on election winner.
[†]Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table VI: Electorate Demographics, Vote Distributions and Election Winners
Forsythe, Myerson, Rietz and Weber (1992), 8 Elections per Voting Group

Session PWOPS1 (Plurality Voting, No Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.479	.495	.021	.005	--	--	--	--	.479	.495	.026
G	4	1	1.2	1.6	0.3	.234	.724	.042	.000	--	--	--	--	.724	.234	.042
B	6	1	0.6	0.6	1.9	.080	.042	.875	.003	--	--	--	--	.875	--	.125
Overall Vote Fractions:						.238	.366	.393	.003	--	--	--	--	.719	.208	.073
Fractions of Elections Won:						.104	.521	.167	--	.021	.125	.063	.000	--	--	--

Session PWPS1 (Plurality Voting, Pre-Election Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.594	.396	.010	.000	--	--	--	--	.594	.396	.010
G	4	1	1.2	1.6	0.3	.339	.651	.010	.000	--	--	--	--	.651	.339	.010
B	6	1	0.6	0.6	1.9	.024	.028	.948	.000	--	--	--	--	.948	--	.052
Overall Vote Fractions:						.277	.311	.412	.000	--	--	--	--	.761	.210	.028
Fractions of Elections Won:						.313	.417	.125	--	.000	.083	.063	.000	--	--	--

Session AWOPS1 (Approval Voting, No Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.370	.000	.000	.000	.615	.016	.000	.000	.370	.615	.016
G	4	1	1.2	1.6	0.3	.000	.458	.000	.000	.536	.000	.000	.005	.458	.536	.005
B	6	1	0.6	0.6	1.9	.007	.003	.840	.000	.007	.056	.073	.013	.840	--	.160
Overall Vote Fractions:						.109	.132	.360	.000	.331	.028	.031	.007	.597	.329	.074
Fractions of Elections Won:						.229	.313	.021	--	.271	.042	.042	.083	--	--	--

Session AWPS1 (Plurality Voting, Pre-Election Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.453	.010	.015	.000	.510	.010	.000	.000	.453	.510	.036
G	4	1	1.2	1.6	0.3	.010	.422	.005	.005	.500	.000	.021	.036	.422	.500	.078
B	6	1	0.6	0.6	1.9	.000	.007	.892	.000	.000	.049	.031	.021	.892	--	.108

Table VI: Electorate Demographics, Vote Distributions and Election Winners
Forsythe, Myerson, Rietz and Weber (1992), 8 Elections per Voting Group

					Overall Vote Fractions:	.132	.126	.388	.001	.289	.024	.019	.019	.632	.289	.079
					Fractions of Elections Won:	.333	.208	.104	--	.104	.104	.063	.083	--	--	--

Session BWOPS1 (Borda Rule, No Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

		Votes	Payoff Schedule*			Observed Voting and Winning Fractions† (Vectors give 2 Vote Candidate, 1 Vote Candidate, 0 Vote Candidate) (48 Elections)								Frequency of Votes by Type (48 Elections)		
Voter Type	No. of Voters	Vectors per Voter	o	g	b	o.g,b	o,b,g	g,o,b	g,b,o	b,o,g	b,g,o	abst.	--	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.740	.125	.099	.010	.016	.000	.010	--	.740	.224	.036
G	4	1	1.2	1.6	0.3	.031	.000	.698	.260	.000	.010	.000	--	.698	.292	.010
B	6	1	0.6	0.6	1.9	.028	.014	.035	.097	.493	.319	.014	--	.813	--	.188
			Overall Vote Fractions:			.232	.042	.243	.119	.216	.140	.009	--	.759	.147	.094
						o	g	b	og	ob	gb	ogb				
			Fractions of Elections Won:			.229	.563	.083	.083	.000	.000	.042	--	--	--	--

Session BWPS1 (Borda Rule, Pre-Election Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

		Votes	Payoff Schedule*			Observed Voting and Winning Fractions† (Vectors give 2 Vote Candidate, 1 Vote Candidate, 0 Vote Candidate) (48 Elections)								Frequency of Votes by Type (48 Elections)		
Voter Type	No. of Voters	Vectors per Voter	o	g	b	o,g,b	o,b,g	g,o,b	g,b,o	b,o,g	b,g,o	abst.	--	Sincere	Strategic	Dominated
O	4	1	1.6	1.2	0.3	.755	.115	.104	.026	.000	.000	.000	--	.755	.219	.026
G	4	1	1.2	1.6	0.3	.052	.005	.760	.156	.005	.021	.000	--	.760	.208	.031
B	6	1	0.6	0.6	1.9	.003	.003	.020	.014	.556	.396	.007	--	.951	--	.047
			Overall Vote Fractions:			.232	.036	.256	.058	.240	.176	.003	--	.841	.122	.037
						o	g	b	og	ob	gb	ogb				
			Fractions of Elections Won:			.354	.375	.083	.104	.000	.000	.083	--	--	--	--

*Number of U.S. Dollars received conditional on election winner.
†Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table VII: Electorate Demographics, Vote Distributions and Election Winners
Forsythe, Myerson, Rietz and Weber (forthcoming), 1 Election per Voting Group

Session CPSS (Plurality Voting, No Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.2	0.9	0.2	.563	.411	.016	.000	--	--	--	--	.563	.411	.026
G	4	1	0.9	1.2	0.2	.427	.536	.016	.000	--	--	--	--	.536	.427	.036
B	6	1	0.4	0.4	1.4	.014	.007	.972	.000	--	--	--	--	.972	--	.028
			Overall Vote Fractions:			.289	.274	.426	.000	--	--	--	--	.731	.240	.030
			Fractions of Elections Won:			.000	.042	.797	--	.000	.125	.042	.000	--	--	--

Session CPSSP (Plurality Voting, Pre-Election Polls). Condorcet Ranking: o~g≻b. Sincere Vote Total Ranking: b>o=g.

Voter Type	No. of Voters	Votes Vectors per Voter	Payoff Schedule*			Observed Voting and Winning Fractions† (48 Elections)								Frequency of Votes by Type (48 Elections)		
			o	g	b	o	g	b	abst.	og	ob	gb	ogb	Sincere	Strategic	Dominated
O	4	1	1.2	0.9	0.2	.745	.229	.016	.000	--	--	--	--	.745	.229	.026
G	4	1	0.9	1.2	0.2	.484	.484	.026	.000	--	--	--	--	.484	.484	.031
B	6	1	0.4	0.4	1.4	.042	.010	.934	.000	--	--	--	--	.934	--	.066
			Overall Vote Fractions:			.369	.208	.412	.000	--	--	--	--	.751	.204	.045
			Fractions of Elections Won:			.417	.188	.271	--	.000	.083	.042	.000	--	--	--

*Number of U.S. Dollars received conditional on election winner.
†Two or three letters (e.g., ab) denote votes for both of the listed candidates or ties between the listed candidates.

Table VIII: Fractions of Sincere, Strategic and Dominated Vote Vectors Cast by Voters who Could Cast All Three Vote Vector Types

Paper and Session or Game	Voting Rule	Elections Per Voting Group	Voter Types Included	Percentage of Vote Vectors that were:		
				Sincere*	Strategic†	Dominated‡
FMRW1, PWOPS1	Plurality	8	O and G	60.16%	36.46%	3.39%
FMRW1, PWPS1	Plurality	8	O and G	62.24%	36.72%	1.04%
FMRW2, CPSS	Plurality	1	O and G	54.95%	41.93%	3.13%
FMRW2, CPSS	Plurality	1	O and G	61.46%	35.68%	2.86%
FRM, Exp. 1, Game 1	Plurality	6	All	88.30%	7.10%	4.60%
FRM, Exp. 1, Game 2	Plurality	6	All	69.60%	27.90%	2.50%
FRM, Exp. 1, Game 3	Plurality	6	All	56.30%	43.80%	0.00%
FRM, Exp. 1, Game 4	Plurality	6	All	58.30%	41.30%	0.40%
FRM, Exp. 1, Game 5	Plurality	6	All	63.80%	35.00%	1.30%
FRM, Exp. 1, Game 6	Plurality	6	All	58.80%	38.30%	2.90%
FRM, Exp. 1, Game 7	Plurality	6	All	60.00%	38.30%	1.70%
RFM, Exp. 1, Game 1	Plurality	6	All	55.00%	41.00%	4.00%
RFM, Exp. 1, Game 2	Plurality	6	All	63.70%	32.30%	4.00%
RFM, Exp. 1, Game 3	Plurality	6	All	68.30%	28.00%	3.70%
RFM, Exp. 1, Game 4	Plurality	6	All	66.00%	32.00%	2.00%
RFM, Exp. 1, Game 5	Plurality	6	All	58.00%	37.70%	4.30%
RFM, Exp. 1, Game 6	Plurality	6	All	67.30%	30.30%	2.30%
RFM, Exp. 1, Game 7	Plurality	6	All	71.30%	27.70%	1.00%
RFM, Exp. 2, Game 1	Plurality	6	All	61.10%	34.40%	4.40%
RFM, Exp. 2, Game 2	Plurality	6	All	59.70%	37.20%	3.10%
RFM, Exp. 2, Game 3	Plurality	6	All	65.80%	32.20%	1.90%
RFM, Exp. 2, Game 4	Plurality	6	All	66.10%	33.60%	0.30%
RFM, Exp. 2, Game 5	Plurality	6	All	67.50%	31.10%	1.40%
RFM, Exp. 2, Game 6	Plurality	6	All	71.70%	27.80%	0.60%
RFM, Exp. 2, Game 7	Plurality	6	All	64.20%	35.30%	0.60%
RFM, Exp. 2, Game 8	Plurality	6	All	66.90%	32.80%	0.30%
FMRW1, AWOPS1	Approval	8	O and G	41.41%	57.55%	1.04%
FMRW1, AWPS1	Approval	8	O and G	43.75%	50.52%	5.73%
FRM, Exp. 2, Game 1	Approval	6	All	66.30%	21.30%	12.50%
FRM, Exp. 2, Game 2	Approval	6	All	45.80%	34.60%	19.60%
FRM, Exp. 2, Game 3	Approval	6	All	55.00%	36.70%	8.30%
FRM, Exp. 2, Game 4	Approval	6	All	48.30%	44.60%	7.10%
FRM, Exp. 2, Game 5	Approval	6	All	46.30%	47.10%	6.70%
FRM, Exp. 2, Game 6	Approval	6	All	77.90%	15.40%	6.70%
FRM, Exp. 2, Game 7	Approval	6	All	47.50%	45.40%	7.10%
RFM, Exp. 3, Game 1	Approval	6	All	35.30%	30.00%	34.70%
RFM, Exp. 3, Game 2	Approval	6	All	28.00%	40.30%	31.70%
RFM, Exp. 3, Game 3	Approval	6	All	43.30%	40.00%	16.70%
RFM, Exp. 3, Game 4	Approval	6	All	28.70%	54.30%	17.00%
RFM, Exp. 3, Game 5	Approval	6	All	33.00%	27.30%	39.70%
RFM, Exp. 3, Game 6	Approval	6	All	34.70%	55.30%	10.00%
RFM, Exp. 3, Game 7	Approval	6	All	42.70%	46.00%	11.30%
FMRW1, BWOPS1	Borda	8	O and G	71.88%	25.78%	2.34%
FMRW1, BWPS1	Borda	8	O and G	75.78%	21.35%	2.86%

*In order of votes for the voter's first, second and third preference, sincere vote vectors are [1,0,0] under plurality voting and approval voting and [2,1,0] under Borda Rule.

†In order of votes for the voter's first, second and third preference, strategic vote vectors are [0,1,0] under plurality voting, [1,1,0] under approval voting and [1,2,0] and [2,0,1] under Borda Rule.

‡All other vote vectors.

Table IX%: Votes Cast by Majority Voters Conditional on Previous Majority Candidate Rankings in Plurality Voting Session of FMRW1 and FMRW2

				Percentage of Votes Cast for Each Candidate by Majority Voters (Type O and G Voters)				χ^2-Statistic (d.o.f.)
Session	Previous Event	Ranking	Obs.	Orange	Green	Blue	Abst	Prob[$\chi^2 > \bullet$]
PWOPS1	Election	Orange leads Green	88	86.36	13.64	0.00	0.00	180.3206
		Tie	64	46.88	48.44	4.69	0.00	(6)
		Green leads Orange	232	9.05	86.64	3.88	0.43	0.000
PWPS1	Poll	Orange leads Green	154	76.62	23.38	0.00	0.00	109.1454
		Tie	34	52.94	41.18	5.88	0.00	(4)
		Green leads Orange	196	22.96	76.02	1.02	0.00	0.000
PWPS1	Election	Orange leads Green	136	36.76	63.24	0.00	0.00	30.4503
		Tie	64	48.44	45.31	6.25	0.00	(4)
		Green leads Orange	184	54.35	45.65	0.00	0.00	0.000
CPSSP	Poll	Orange leads Green	192	90.63	8.33	1.04	0.00	181.2926
		Tie	88	51.14	40.91	6.82	1.14	(6)
		Green leads Orange	104	16.35	81.73	0.00	1.92	0.000

Figure 1: Borda's First Example.

Payoff Schedule

Voter Type	Election Winner "A"	"B"	"C"	Total Number of Each Type
1	$1	$0	$0	8
2	$0	$1	$0.9	7
3	$0	$0.9	$1	6

Figure 2: Flowchart of Model RFM.

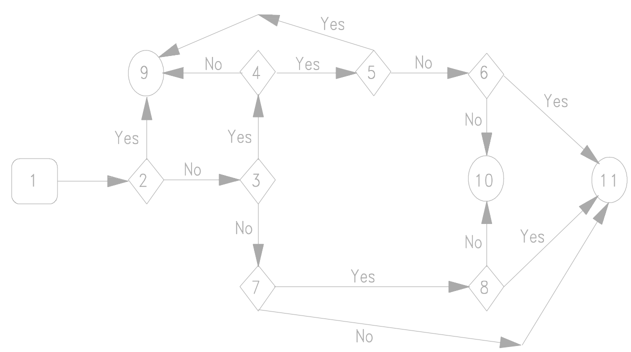

Figure 3: FMRW1 and FMRW2's "Symmetric" Payoff Schedule.

Payoff Schedule Group: __

Voter Type	Election Winner Orange	Green	Blue	Total Number of Each Type
1 (O)	$1.60	$1.20	$0.30	4
2 (G)	$1.20	$1.60	$0.30	4
3 (B)	$0.60	$0.60	$1.90	6

Figure 4: Effects of Condorcet Ranking and Sincere Voting Ranking on Fractions of Elections Won by Alternatives Under Plurality Voting. (Data from FRM, Experiment 1 and RFM, Experiments 1 and 2.)

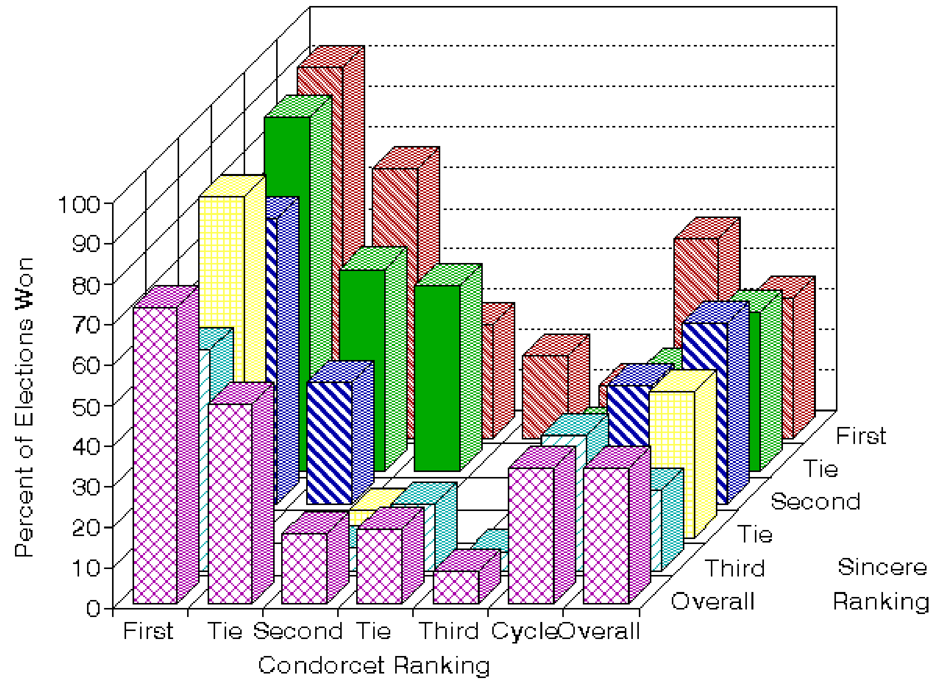

Figure 5: Effects of Condorcet Ranking and Sincere Voting Ranking on Fractions of Elections Won by Alternatives Under Approval Voting. (Data from FRM, Experiment 2 and RFM, Experiment 3.)

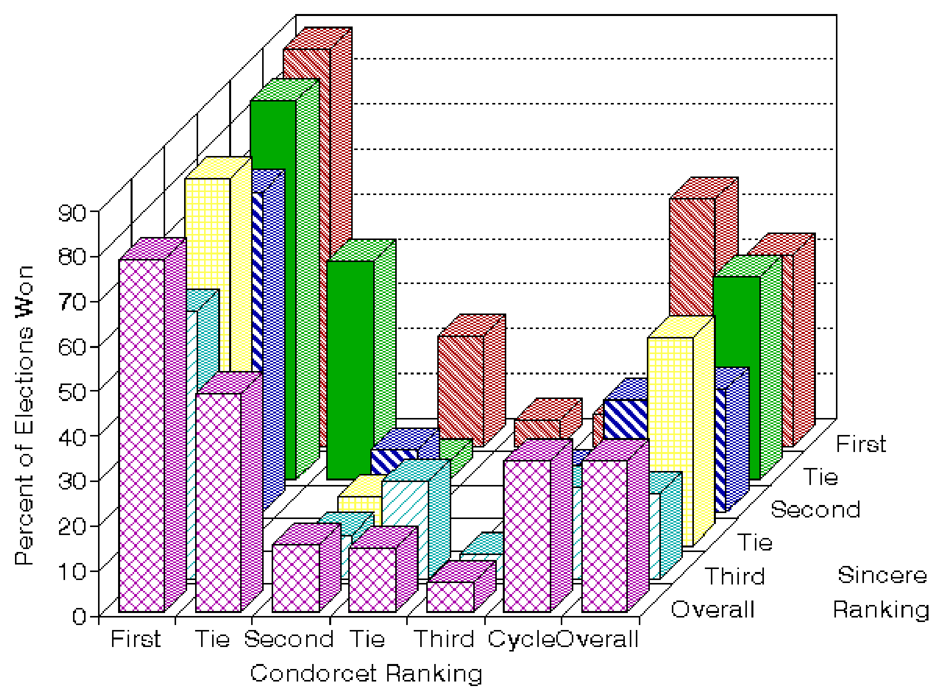

Figure 6: Average Second and Third Place Vote Totals as Fractions of First Place Vote Totals and Fractions of Elections in which One Alternative Received Zero Votes in Data from FRM.

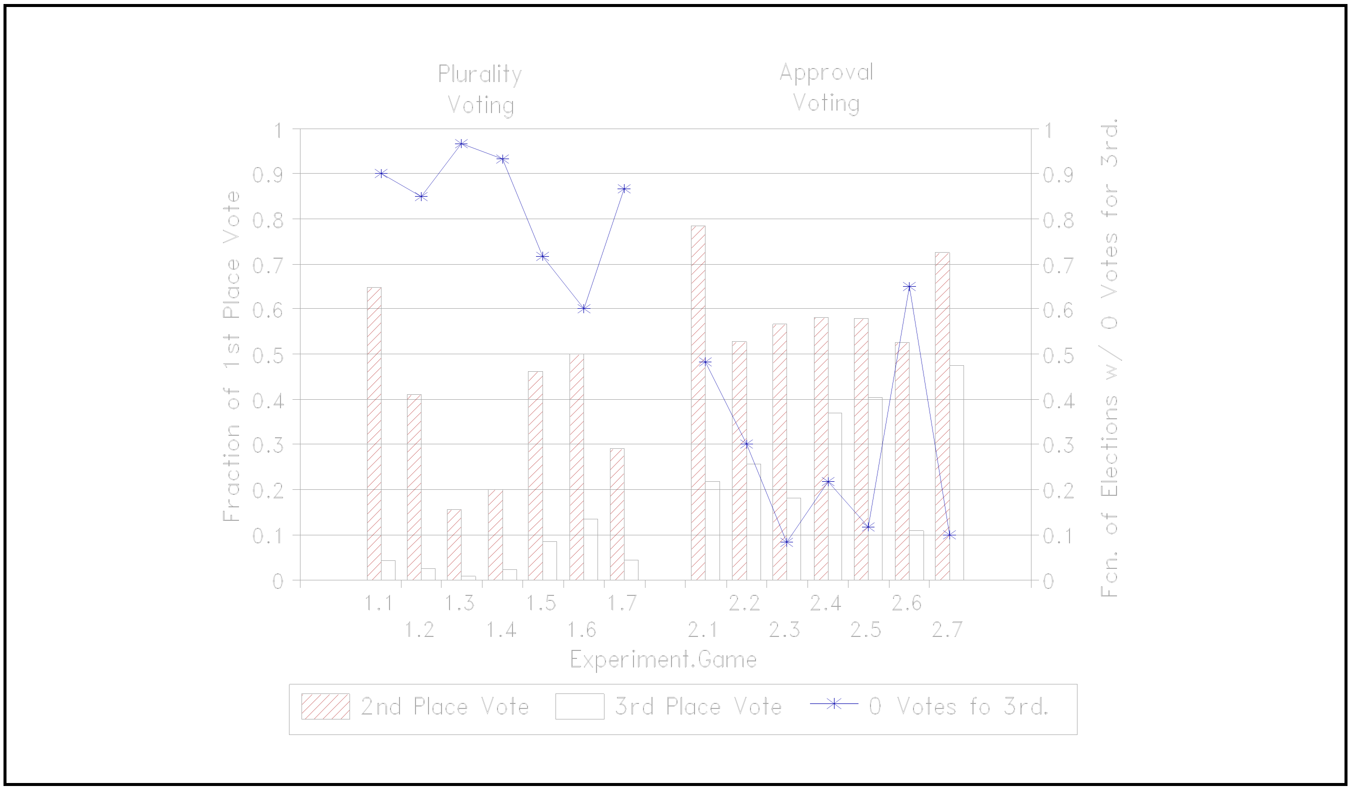

Figure 7: Average Second and Third Place Vote Totals as Fractions of First Place Vote Totals and Fractions of Elections in which One Alternative Received Zero Votes in Data from FMRW1 and FMRW2.

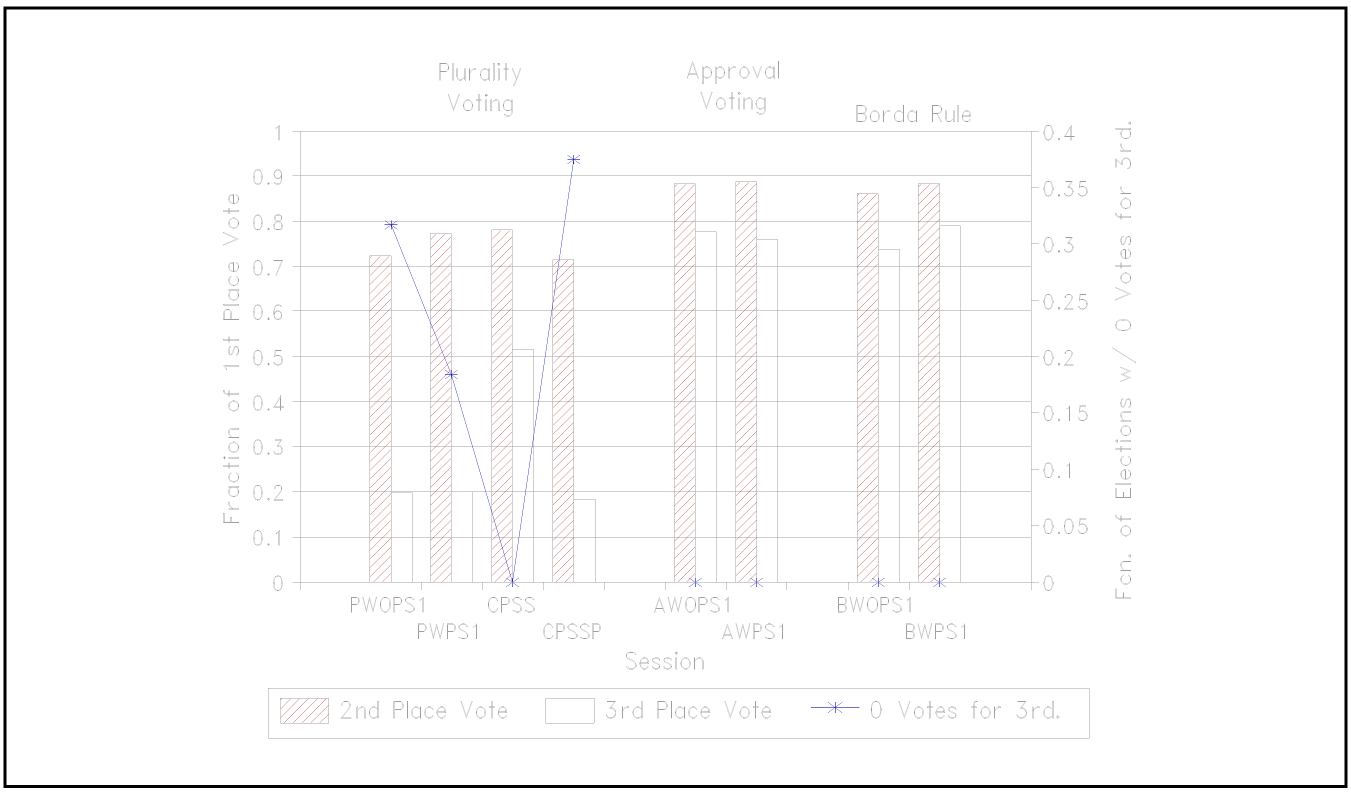

Figure 8: Del Values for Models S, F, NF, RFM (without *Step 2*) and RFM (with *Step 2*) Using Data from FRM and RFM.

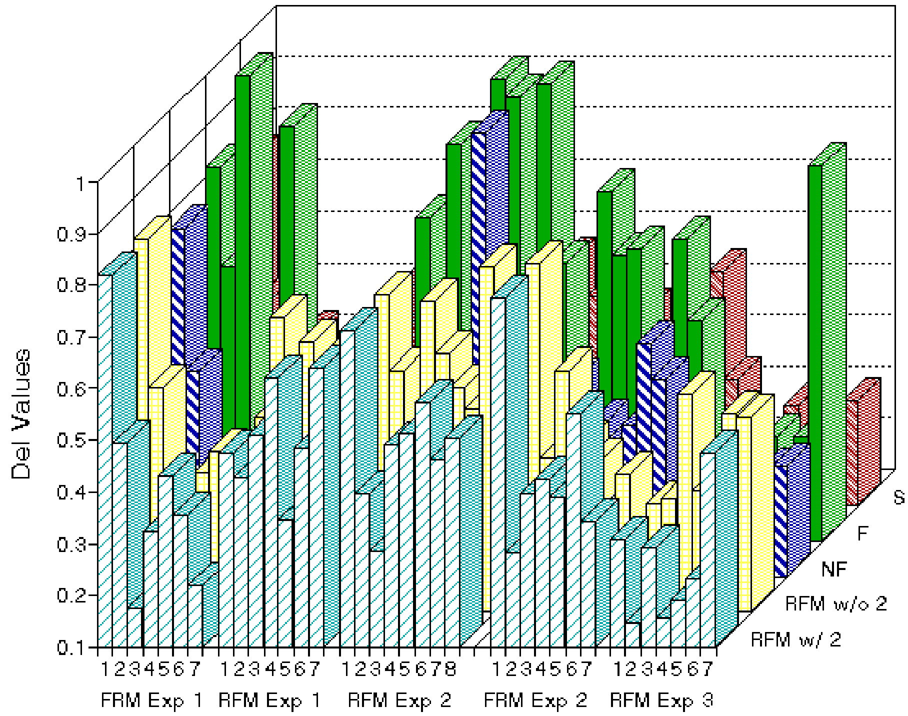

Figure 9: Del Values for Models S, F, NF, RFM (with or without *Step 2*) and MW Using Data from FMRW1 and FMRW2.

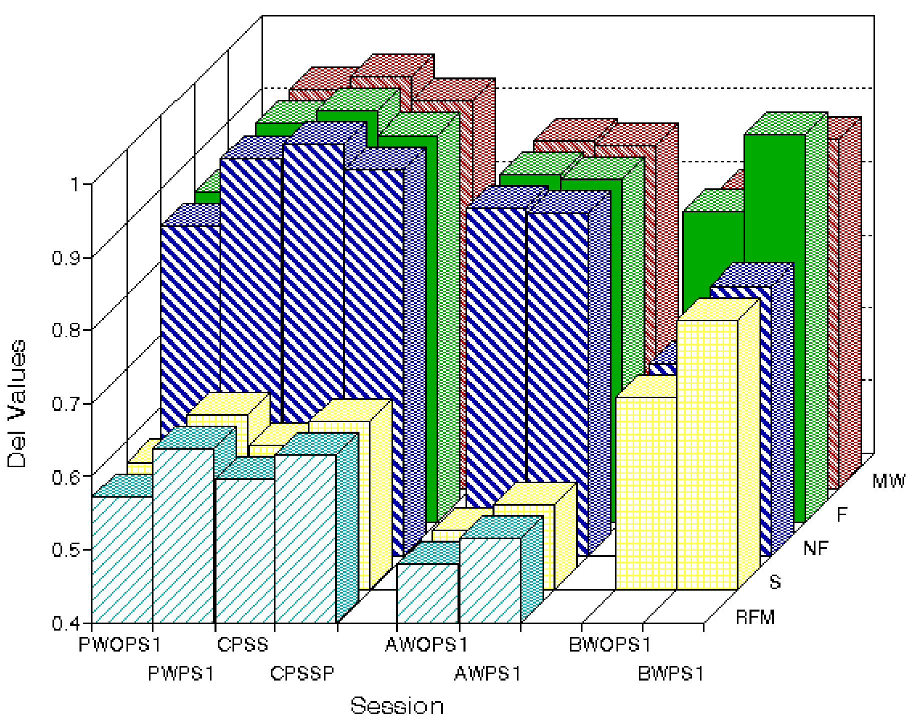

Figure 10: Percentage of Times Voters of a Given Type Voted as a Bloc in Data from FMRW1 and FMRW2.