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Duverger's Law and Strategic Voting in Large Scale Elections

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Research Question

Does an increase in voter number falsify Duverger or Strategic Voting models developed in Game Theory or Experimental Voting?

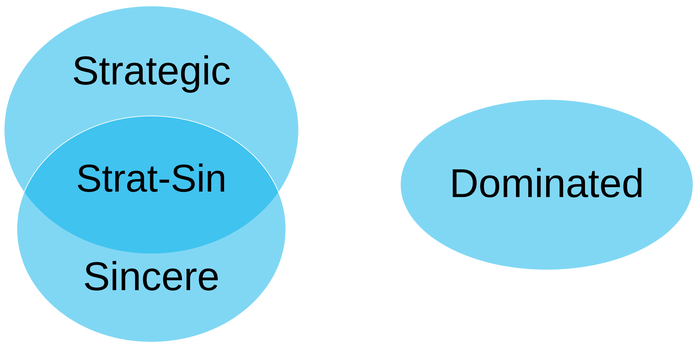
Hypotheses and Results

- As voter number increases:
  - Strategic Voting decreases, but behavior is still more strategic than randomness
  - Duverger's Law still holds

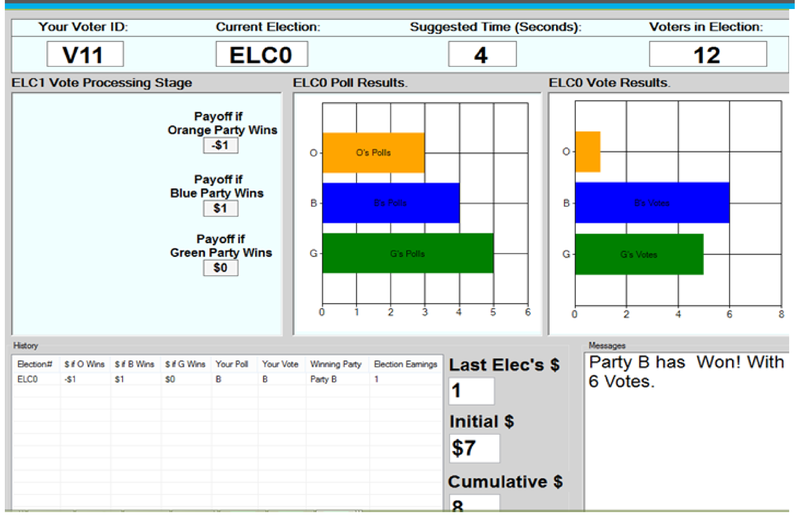
Methodology

- Our research utilized experimental human subject based testing via researcher engineered computer software in laboratories.
- Participants were randomly drawn from an experimental economic database of Chapman University, Orange, CA undergraduates
- Participants were controlled for major, gender and academic year.
- 12 Participants polled and voted in 24 Elections, each with randomly generated monetarily induced party preferences
- Subjects were paid directly in cash at 1 experimental dollar to 1 USD. The were given an endowment of $7 to $17. The mean payout was around $15 for a 30 minute experiment.
- Elections consists of 2 stages: a Poll Stage and a Vote stage
- Poll Stage: participants are shown their preferences and poll for their party of choice based only on their party payoffs. The polls are turned into a bar chart
- Vote Stage: voters can see the results of the poll and can vote. Payoffs are assigned by the monetary preference of each voter corresponding to the party with the most votes.
- Election sizes used: 12 voter elections, 600 voter elections and 220,000 voter elections. Each simulation aided experiment had three groups each corresponding to one of the election sizes.
- Simulated Voters had sophisticated human-approximating behavior based on data gathered from experiments using only human subjects

Voting Behavior



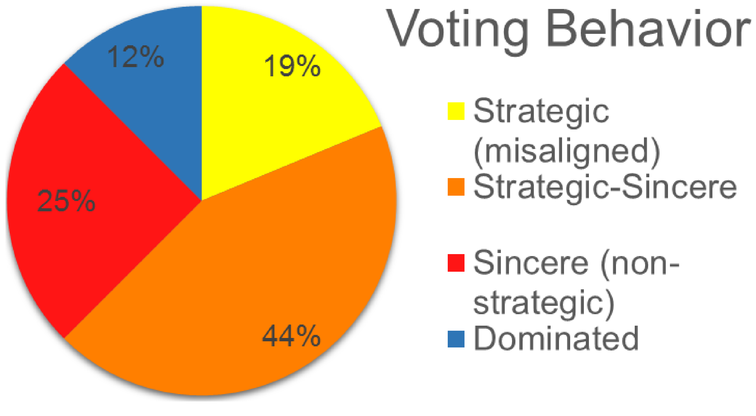
Voter View



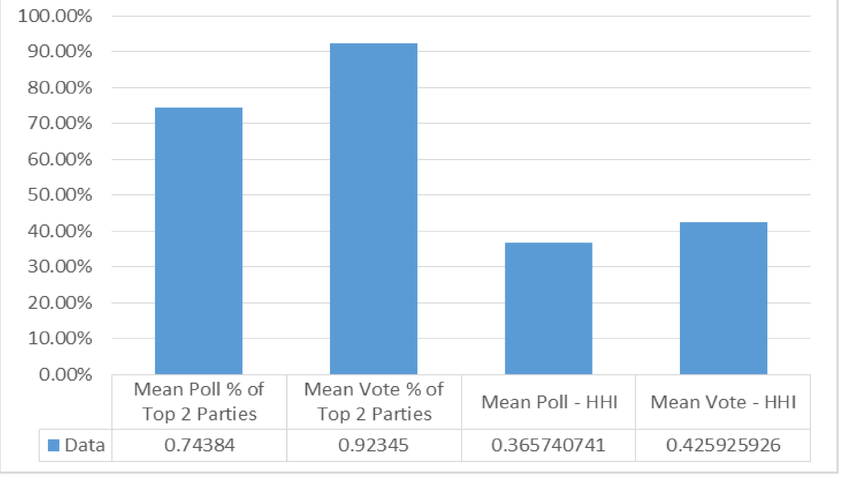
Vocabulary

- Plurality Voting: an electoral system in which political goods are allocated based on which one receives the most votes
- Sincere Vote: a vote for a voter's most preferred party
- Strategic Vote: a vote that for the party with a higher pivot probability, but is still preferred to the party with the next highest pivot probability. "Casting a vote that will count"
- Dominated Vote: a vote for the least favored party or for a party with which is both less favored and less likely to win.
- Misaligned vote: a Strategic, but Insincere vote
- Defection: Casting a strategic vote for a party other than the most preferred. "Casting a misaligned Vote"
- Herindahl-Hirschman Index (HHI) gives poll/vote concentration over parties. Mathematically it is the sum of the squared Vote shares. (e.g. if1 party receives all votes, HHI = 1^2 =1, if 2 parties each receive 50% of the votes than HHI = .5^2 +.5^2 = .5
- Duverger's Law: Plurality Rule elections favor two party outcomes

Voter Behavioral Data



Poll and Vote Party Data



	Mean Poll % of Top 2 Parties	Mean Vote % of Top 2 Parties	Mean Poll - HHI	Mean Vote - HHI
Data	0.74384	0.92345	0.365740741	0.425925926

Herfindahl–Hirschman Index (HHI)

Gives the poll or vote concentration between the parties. Higher HHI means more concentrated poll or vote share, lower indicates a more evenly distributed poll or vote share among more parties

$$HHI = \sum_{i=1}^{N} s_i^2$$

- N is the number of parties
- s is the vote or poll share (%) of the total electorate each party receives.
- Measures the poll vote concentration across the electorate
- Used to show changes in concentration

Simulated Voter Behavior

- Simulated Voter Behavior aims to be human-like not necessarily optimal, the goal is to have the human voters behave as similarly as possible to how they would behave all voters were human subjects
- Data was gathered from elections with all human subject participants and used to create Markov chain decision matrices linking simulated voter's to participants by conditioning polls on previous polls and votes on elections polls. These made simulated voters appear to "improve" their decisions as voting and polling approach the steady state, emulating human learning.
- Subjects at the end of all experiments were "quizzed" to distinguish between human voter and simulated voter decisions. The identification accuracy was 52% - statistically indistinguishable from random choices

Works Cited and Acknowledgements

- Duverger, Maurice. 1954. Political Parties. New York: Wiley.
- Felsenthal DS, Rapoport A, Maoz Z (1988) Tacit Cooperation in Three Alternative Non- Cooperative Voting Games Electoral Studies
- Myerson and Weber; A Theory of Voting Equilibria; APSR 1993

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