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Voting, Elections and Statistical Science

Welcome to the special elections issue of *Statistical Science*. This issue describes fundamental principles and recent research in the quantitative analysis of voting in elections for political office around the world. In thinking about this issue, the two of us wanted to find high quality applied work that analyzes how and why people vote (or do not vote) as they do. This is a very dynamic area of research that lies at the intersection of two disciplines: statistics and political science. Therefore, the articles here are written by a mixture of scholars from both backgrounds.

This issue begins with a general introduction to voting theory by Jeff Gill and Jason Gainous. There has been much work concerning the rationality and reasonability of voting in prescribed ways, leading to better understanding the systematic trends in human voting behavior. Also, it turns out that the means by which votes are aggregated to determine a winner varies considerably and can provide different outcomes. This article reviews these ideas and provides a general background for the rest of the issue.

The topic of voting is further explored by Andrew Gelman, Jonathan Katz and Francis Tuerlinckx, who look at weighted and two-stage voting systems with an interest in *voting power*. This is the probability that a voter or group of voters plays a decisive role in the outcome of an election. While the various indices of this power surveyed in this article are considered to be purely mathematical constructs, they actually depend on the underlying statistical model implied.

In the second article, Kevin Quinn and Andrew Martin look at a second order objective that occurs in systems with proportional representation. These systems give political parties seats in legislatures based on their total percentage of the vote. Quinn and Martin claim that competing parties have two objectives: maximizing votes and positioning themselves for coalition building after the elections. Their empirical test uses data from the 1989 Dutch election and estimates multiparty objective functions in the presence of limited information.

The 2000 presidential election in Florida generated considerable interest in both the mechanics and the empirics of voting in the United States, and is partially the reason why this issue of *Statistical Science* came to be. Apparently, Florida represents a special case in American politics because it is a state that is almost equally divided in terms of partisanship and is big enough to matter considerably in national elections.

Alan Agresti and Brett Presnell provide the background to place the 2000 contest in context as a data-analytic problem, introducing Richard Smith's article that focuses on Pat Buchanan's unusual showing in Palm Beach county. This Florida county is in a liberal-leaning, upper-middle class region with a considerable number of northeastern retirees, so a far-right conservative candidate should not do well. As Smith explains, the Buchanan vote is certainly anomalously large.

Complexity, obfuscation, vagueness and uncertainty seem to be permanent features of American electoral politics (Aldrich, Niemi, Rabinowitz and Rohde, 1982). As modern social and economic issues become more complicated, poorly explained or misunderstood issues appear on ballots (Gafke and Leuthod, 1979), as well as do confusing or complex ballot measures that confuse voters (Gerber, 1996). For example, the 1996 ballot initiative in California to eliminate state supported affirmative action programs, Proposition 209, confused many voters on its actual intent (*Los Angeles Times*, October 31, 1996, page A22). The words "affirmative action" do not appear anywhere in the bill's language. Moreover, candidates often have motivations to make their issue positions deliberately vague (see, e.g., Franklin, 1991). This can be out of a desire not to alienate certain constituency groups or simply that the candidate lacks a strongly defined position.

So why do many voters endure high levels of uncertainty and cast their ballot? The answer is elusive, although well studied in the literature since Downs (1957). There also has been an increased awareness that formalistic certainty and reliance upon absolute principle is not going to advance our knowledge in this area: "Models that rely on the assumption of complete information may offer a misleading view of the democratic process" (Ordeshook, 1986, page 187).

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All of this makes the *statistical* study of voting particularly appropriate and appealing. Voting behavior is one of the few aspects of human behavior and human interaction that is truly measurable and observable. There are both systematic as well as stochastic components, although these can be complex to sort out. The discipline of statistics has well-developed theoretical tools to handle routine data problems that emerge from the study of elections and voting: measurement error, missing data, heteroscedasticity, nonparametric functional forms and other issues. Finally there is the interesting phenomenon that predictions from statistical models can be tested since there is always a future election.

The goal of the elections issue of *Statistical Science* is to advance overall knowledge and understanding of this interesting social phenomenon, as well as to call attention to a challenging set of problems for statisticians and political scientists. The contributing authors here have done an excellent job of providing fundamental concepts as well as new methods and new theories, and the hard work of a number of reviewers helped make the presentations even better. We especially thank Jim Albert, Neal Beck, Frederick Boehmke, Barry Burden, Dennis Cook, Steve Fienberg, Joseph Gastwirth, Garrett Glosgow, Mel Hinich, Walter Mebane, Yuval Peres, Tim Swartz, Dan Wood and Chris Zorn.

We are enthusiastic about this collection of essays both as readers and as two, sometimes confused, Florida voters. We hope that you will find these works as interesting as we did.

George Casella, Executive Editor
Jeff Gill, Guest Editor

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