

Districting Principles and Democratic Representation

Thesis by

Micah Altman

In Partial Fulfillment of the Requirements for the Degree of Doctor of
Philosophy

California Institute of Technology

Pasadena, California

Mar. 31, 1998

Districting Principles and Democratic Representation

Acknowledgements

I thank Morgan Kousser for continuous guidance and wise advice throughout the course of the dissertation, as well as for teaching me to write. I wish to thank Scott Page for his numerous insightful comments and assistance during the course of the dissertation. I thank Mike Alvarez and Rod Kiewiet for their comments and assistance during the course of the dissertation.

I also thank Gary King, Daniel Lowenstein and Ken McCue for their comments on individual chapters.

Abstract

Redistricting is always political, increasingly controversial, and often ugly. Politicians have always fought tooth-and-nail over district lines, while the courts, for most of their history, considered the subject a thicket too political even to enter.

Three decades ago the courts finally entered the political thicket, ruling in *Baker v. Carr* (1962) that redistricting was justiciable. A decade ago, the court showed signs that it wanted to chop the thicket down, ruling in *Davis v. Bandemer* (1986) that partisan gerrymanders were actionable. But, in fact, few suits followed this potentially momentous decision. Just five years ago, however, the court took its ax to the thicket in earnest: In a line of cases starting with *Shaw v. Reno* in 1993, and continuing through the

1996-97 term of court in *Abrams v. Johnson* (1997), the Court has made a strong bid to outlaw what it terms “racial gerrymandering.” In this attempt to eliminate gerrymandering, the Court has placed an extreme emphasis on what they term “traditional districting principles,” which are primarily formal, measurable criteria such as population equality, compactness, and contiguity.

This extreme emphasis threatens to radically change the redistricting process in the United States. Justice Souter, in a dissent in *Vera* in which Justices Ginsburg and Breyer joined, argued that the logic of the *Shaw* line of cases can lead only to one of two outcomes: Either “the Court could give primacy to the principle of compactness,” or it could radically change traditional districting practice -- eliminating it or “replacing it with districting on some principle of randomness...”

In this dissertation, I examine “traditional districting principles,” and their implications for representation. I am motivated by, and attempt to answer, the following questions: What theories of representation are implicit in the Court's recent line of cases? Where do “traditional districting principles” come from, and are they really traditional? Are the formal standards that the Court wishes to adopt judicially manageable? Are they theoretically consistent? What effect will using these principles have on politics? Can we eliminate politics in redistricting by automating the process?

Contents

The dissertation is organized into six chapters. In Chapter 1, I discuss the legal debates over redistricting principles, and how this dissertation, and political science in general, can shed light on this debate. In Chapters 2 and 3 I define measures for and gather data about historical and modern districts. In Chapter 4 I develop a model to predict the partisan effects of applying strict compactness standards. In Chapter 5, I analyze the theoretical and practical limitations of mechanically applying any formal districting principles. Finally, in Chapter 6, I apply statistical models to determine the effects of traditional districting principles on recent elections.

- Unprincipled Limitations on Gerrymandering: The Supreme Court's Tempestuous Use of Traditional Districting Principles
- The Consistency and Effectiveness of Mandatory District Compactness Rules
- Traditional Districting Principles: Judicial Myths vs. Reality
- Predicting the Electoral Effects of Mandatory District Compactness on Partisan Gerrymanders
- Is Automation the Answer? -- The Computational Complexity of Automated Redistricting
- Do Traditional Districting Principles Matter?

1. Unprincipled Limitations on Gerrymandering: The Supreme Court's Tempestuous Use of Traditional Districting Principles

Theories created in the absence of fact are fantasies, and decisions made in the absence of theory are impulses. In its latest opinion on redistricting, *Bush v. Vera*, the Supreme Court produces both. It is a truism that judicial principles emerge from the consideration of individual cases, and we do not expect theories of representation to spring from the court like Athena from the head of Zeus, fully-formed. After more than three decades of redistricting cases, however, the Court should be able to give a consistent answer to redistricting's central legal question: What constitutional harm does gerrymandering cause?

In an effort to avoid considerations of politics, the Court has turned to “traditional districting criteria.” I show that the Court's use of these districting principles distorts the history of districting, exaggerates the political importance of these principles, and ignores theories of political representation.

2. The Consistency and Effectiveness of Mandatory District Compactness Rules

As the technology for drawing districts has become more sophisticated, and as the Supreme Court has grown more critical of district lines, academics and politicians have renewed their interest in evaluating and regulating legislative districts. In the field of redistricting, one of the most significant and controversial claims is that gerrymandering can be easily eliminated by requiring districts to be “compact.”

Compactness criteria attempt to measure the irregularity of a district's shape; in other words, they capture its ugliness. Political scientists and geographers have measured compactness in many different ways, and some of these measurements have been used to

investigate isolated district plans. There is, however, no scholarly consensus on which compactness measure, if any, is best. Furthermore, while scholars have debated the merits of compactness measures in general terms, most of this debate has been based only upon hypothetical or isolated examples. Political scientists have done little formal modeling of or empirical research into this issue. Many important questions remain open: What, exactly, are all of these compactness criteria measuring? Are these measures consistent with each other -- does it matter, really, which one we use? Which measures are best?

In this chapter, I answer these questions by using formal analysis and by exhaustively analyzing small sets of districts. First, I find that many compactness criteria can, in fact, contradict each other; contrary to the claims of some previous researchers, it matters which measure we choose. Second, I find that some measures are, indeed, better than others -- though the existence of a single best measure is doubtful.

3. Traditional Districting Principles: Judicial Myths vs. Reality

Compactness, contiguity, respect for electoral boundaries and population equality have been hailed as “traditional districting principles.” Proponents bemoan their decline, and blaim modern techniques for gerrymandering and the creation of majority-minority of districts. Are these principles traditional? Are they in decline, and if so, why? In this chapter, I examine this question in the light of historical evidence from all district plans 1789 and 1913, and decadal redistricting plans from 1923 to 1993.

I find that historical districts were more likely to be both regularly shaped and to follow natural boundaries than are modern districts. Most of the decline in district compactness, however, directly followed the Court's decision to impose strict equal population standards on districts, far preceding the creation of majority-minority districts and modern use of computers in redistricting. Moreover, a study of historical Congressional debates shows that formal districting principles such as contiguity were subordinate to the main purpose of redistricting -- expressing representational values.

4. Predicting the Electoral Effects of Mandatory District Compactness on Partisan Gerrymanders

Proponents of a compactness standard have offered it as a politically neutral solution to the problem of gerrymandering. But are such standards, in general, electorally neutral?

In this chapter, I examine the effects of compactness standards on political representation when some political groups are geographically concentrated. By treating redistricting formally as a combinatorial optimization problem, I examine the neutrality of compactness standards and the ability of such standards to prevent gerrymandering. Since these problems cannot, in general, be solved exactly, I use Monte-Carlo techniques, simulated annealing, genetic algorithms, and other simulation techniques to solve them approximately.

These simulations reveal that compactness standards, when strictly applied, do constrain electoral manipulation, but that they are not electorally neutral. The particular effects of compactness depend on both the distribution of voting groups and the political

institutions under which districts are created. If compactness attains primacy over other districting principles, large geographically concentrated minority groups will benefit. On the other hand, where redistricting is primarily a partisan process constrained by compactness, the party which relies on such groups will be relatively weakened by compactness constraints.

5. Is Automation the Answer? – The Computational Complexity of Automated Redistricting

Over the last three decades, many academics, politicians, and judges have called for redistricting to be automated in order to prevent gerrymandering and promote electoral fairness. Automated redistricting has been offered as a general-purpose, unbiased, and value-free method for creating districts. While proponents have consistently expressed optimism about its feasibility and benefits, the results of automated redistricting systems have fallen short of these optimistic expectations.

In this chapter, I explain the failure of automated redistricting: I show that for any computer program to find the “best” district, it must solve a mathematical problem that is *computationally complex*; redistricting belongs to a class of problems that many computer scientists believe to be impossible to solve precisely and efficiently.

I argue that it may be impossible to design an automated redistricting system that both is assured to find optimal districts and is “value-free.” Because of the difficulty of the redistricting problems, automated redistricting methods may always contain biases in

the types of districts they create or assumptions about the values to be used in the redistricting process.

6. Do Traditional Districting Principles Matter?

In recent cases, the Supreme Court has given geographical compactness and other “traditional districting criteria” a large role in its “strict scrutiny” of majority-minority districts. In the future, it is possible that formal measures of district shape will become as pervasive in the design of district plans as formal measures of district population equality are at present. Yet a central empirical question remains unanswered: Do these principles ultimately affect elections? Do these bizarre districts, as opponents argue, cause “expressive harms” to voters? In this paper I use multiple measures to evaluate congressional districting plans, and maximum-likelihood models to analyze the relationship between the “traditional” properties of modern and historical district plans electoral outcomes.

I find that while different population-equality measures, even those with poor theoretical properties, produce very similar evaluations of plans. On the other hand, different compactness measures fail to agree over the compactness of most districts and plans.

In effect, the courts can use any convenient measure of population equality and obtain similar results, while the courts' choice of compactness measures will significantly change the evaluations in each case. Since there is no single generally accepted measure of compactness, this disagreement among measures raises concerns about whether

compactness is a readily operationalizable notion, to use a social scientific formulation, or a judicially manageable one, to employ terms from law.

Furthermore, my results indicate that, in modern elections, traditional districting principles do not have many of the virtues attributed to them. Although reductions in malapportionment may reduce partisan bias, the addition of district compactness has little effect on partisan bias or responsiveness. The only detectable effect of shape was on turnout. Moreover, I could find little evidence that bizarre districts cause “expressive harms.”