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Electing a Single Winner: Approval Voting in Practice

1.1. INTRODUCTION

It may come as a surprise to some that there is a science of elections, whose provenance can be traced back to the Marquis de Condorcet in eighteenth-century France, Charles Dodgson (Lewis Carroll) in nineteenth-century England, and Kenneth Arrow in twentieth-century America. Since Arrow published his seminal book, *Social Choice and Individual Values*, more than fifty years ago (Arrow, 1951, 1963)—for which in large part he received the Nobel Memorial Prize in Economics in 1972—there have been thousands of articles and hundreds of books published on everything from the mathematical properties of voting systems to empirical tests of the propensity of different systems to elect centrist candidates.[1]

The 2000 U.S. presidential election highlighted, among other things, the frailties of voting machines and the seeming arbitrariness of such venerable U.S. institutions as the Electoral College and the Supreme Court. Political commentary has focused on these aspects but given very little attention to alternative voting systems, about which the science of elections has much to say.

Several alternative systems for electing a single winner have been shown to be far superior to *plurality voting* (PV)—the most common voting system used in the United States as well as in many other places—in terms of a number of criteria. PV, which allows citizens to vote for only one candidate, suffers from a dismaying flaw. In any race with more than two candidates, PV may elect the candidate least acceptable to the majority of voters. This frequently happens in a three-way contest, when the majority splits its votes between two centrist candidates, enabling a candidate on the left or right to defeat both centrists. PV also

Note: This chapter is adapted from Brams and Fishburn (2005) with permission of Springer Science and Business Media; see also Brams (2002, 2006b) and Brams and Fishburn (1992a).

[1] For background on the formal theory underlying social choice and collective decision-making, see Austen-Smith and Banks (1999, 2005) and Arrow, Sen, and Suzumura (2002). Recent texts include Grillidi Cortono, Manzi, Pennisi, Ricca, and Simeone (1999), Hodge and Klima (2005), Gaertner (2006), and Nurmi (2006).

forces minor-party candidates into the role of spoilers, as was demonstrated in the 2000 presidential election with the candidacy of Ralph Nader. Nader received only 2.7 percent of the popular vote, but this percentage was decisive in an extremely close contest between the two major-party candidates.

Of the alternatives to PV, I recommend *approval voting* (AV), on both practical and theoretical grounds, in single-winner elections. Proposed independently by several analysts in the 1970s (Brams and Fishburn, 1983, 2007, ch. 1), AV is a voting procedure in which voters can vote for, or approve of, as many candidates as they wish in multicandidate elections—that is, elections with more than two candidates. Each approved candidate receives one vote, and the candidate with the most votes wins.

The candidate with the most votes need *not* win in an election. Merrill and Nagel (1987) make the useful distinction between a balloting method, which describes how voters can legally vote (e.g., for one candidate or for more than one), and a decision rule that determines a winner (e.g., the candidate with a plurality wins, or the candidate preferred to all others in pairwise comparisons wins). For convenience, I use the shorthand of AV to mean approval balloting with a plurality decision rule, but I consider other ways of aggregating approval votes later.

In the United States, the case for AV seems particularly strong in primary and nonpartisan elections, which often draw large fields of candidates. Here are some commonsensical arguments for AV that have been made:

1. *It gives voters more flexible options.* They can do exactly what they can under PV—vote for a single favorite—but if they have no strong preference for one candidate, they can express this fact by voting for all candidates they find acceptable. In addition, if a voter's most preferred candidate has little chance of winning, that voter can vote for both a first choice and a more viable candidate without worrying about wasting his or her vote on the less popular candidate.

2. *It helps elect the strongest candidate.* Today the candidate supported by the largest minority often wins, or at least makes the runoff if there is one. Under AV, by contrast, the candidate with the greatest overall support will generally win. In particular, *Condorcet winners*, who can defeat every other candidate in separate pairwise contests, almost always win under AV, whereas under PV they often lose because they split the vote with one or more other centrist candidates.

3. *It will reduce negative campaigning.* AV induces candidates to try to mirror the views of a majority of voters, not just cater to minorities whose voters could give them a slight edge in a crowded plurality contest. It is thus likely to cut down on negative campaigning, because candidates will have an incentive to try to broaden their appeals by reaching out for approval to voters who might have a different first choice. Lambasting such a choice would risk alienating this candidate's supporters and losing their approval.

4. *It will increase voter turnout.* By being better able to express their preferences, voters are more likely to vote in the first place. Voters who think they might be wasting their votes, or who cannot decide which of several candidates best represents their views, will not have to despair about making a choice. By not being forced to make a single—perhaps arbitrary—choice, they will feel that the election system allows them to be more honest, which will make voting more meaningful and encourage greater participation in elections.

5. *It will give minority candidates their proper due.* Minority candidates will not suffer under AV: their supporters will not be torn away simply because there is another candidate who, though less appealing to them, is generally considered a stronger contender. Because AV allows these supporters to vote for *both* candidates, they will not be tempted to desert the one who is weak in the polls, as under PV. Hence, minority candidates will receive their true level of support under AV, even if they cannot win. This will make election returns a better reflection of the overall acceptability of candidates, relatively undistorted by insincere or strategic voting, which is important information often denied to voters today.

6. *It is eminently practicable.* Unlike more complicated ranking systems, which suffer from a variety of theoretical as well as practical defects, AV is simple for voters to understand and use. Although more votes must be tallied under AV than under PV, AV can readily be implemented on existing voting machines. Because AV does not violate any state constitutions in the United States (or, for that matter, the constitutions of most countries in the world), it requires only an ordinary statute to enact.

Voting systems that involve ranking candidates may appear, at first blush, more appealing than AV. One, the Borda count, awards points to candidates according to their ranking. Another is the Hare system of *single transferable vote* (STV)—with variants called the "alternative vote" and "instant runoff"—in which candidates receiving the fewest first-choice votes are progressively eliminated. Their votes are transferred to second choices—and lower choices if necessary—until one candidate emerges with a majority of voters.

Compared with AV, these systems have serious drawbacks. The Borda count fosters "insincere voting" (for example, ranking a second choice at the bottom if that candidate is considered the strongest threat to one's top choice) and is also vulnerable to "irrelevant candidates" who cannot win but can affect the outcome. STV may eliminate a centrist candidate early and thereby elect one less acceptable to the majority. It also suffers from "nonmonotonicity," in which voters, by raising the ranking of a candidate, may actually cause that candidate to lose—just the opposite of what one would want to happen. I give examples of these drawbacks in the appendix to chapter 2.

As cherished a principle as "one person, one vote" is in single-winner elections, democracies, I believe, can benefit more from the alternative principle of "one candidate, one vote," whereby voters make judgments about whether

each candidate on the ballot is acceptable or not. The latter principle makes the tie-in of a vote not to the voter but rather to the candidates, which is arguably more egalitarian than artificially restricting voters to casting only one vote in multicandidate races. This principle also affords voters an opportunity to express their intensities of preference by approving of, for example, all candidates except one they might despise.

Although AV encourages sincere voting, it does not altogether eliminate strategic calculations. Because approval of a less-preferred candidate can hurt a more-preferred approved candidate, the voter is still faced with the decision of where to draw the line between acceptable and unacceptable candidates. A rational voter will vote for a second choice if his or her first choice appears to be a long shot—as indicated, for example, by polls—but the voter's calculus and its effects on outcomes is not yet well understood for either AV or other voting procedures.

While AV is a strikingly simple election reform for finding consensus choices in single-winner elections, in elections with more than one winner—such as for a council or a legislature—AV would not be desirable if the goal is to mirror a diversity of views, especially of minorities; for this purpose, other voting systems should be considered, as I will discuss in later chapters.

On the other hand, minorities may derive indirect benefit from AV in single-winner elections, because mainstream candidates, in order to win, will be forced to reach out to minority voters for the approval *they* (the mainstream candidates) need in order to win. Put another way, these candidates must seek the *consent* of minority voters to be the most approved, or consensus, choices. While promoting majoritarian candidates, therefore, AV induces them to be responsive to minority views.

1.2. BACKGROUND

In this chapter, I describe some uses of AV, which began in the thirteenth century. However, I concentrate on more recent adoptions of AV, beginning in 1987, by several scientific and engineering societies, including the

- Mathematical Association of America (MAA), with about 32,000 members
- American Mathematical Society (AMS), with about 30,000 members
- Institute for Operations Research and Management Sciences (INFORMS), with about 12,000 members
- American Statistical Association (ASA), with about 15,000 members
- Institute of Electrical and Electronics Engineers (IEEE), with about 377,000 members

Smaller societies that use AV include, among others, the Public Choice Society, the Society for Judgment and Decision Making, the Social Choice and Welfare Society, the International Joint Conference on Artificial Intelligence, the European Association for Logic, Language and Information, and the Game Theory Society (see chapter 5).

Additionally, the Econometric Society has used AV (with certain emendations) to elect fellows since 1980 (Gordon, 1981); likewise, since 1981 the selection of members of the National Academy of Sciences (1981) at the final stage of balloting has been based on AV. Coupled with many colleges and universities that now use AV—from the departmental level to the schoolwide level—it is no exaggeration to say that several hundred thousand individuals have had direct experience with AV.

Probably the best-known official elected by AV today is the secretary-general of the United Nations (Brams and Fishburn, 1983). AV has also been used in internal elections by the political parties in some states, such as Pennsylvania, where a presidential straw poll using AV was conducted by the Democratic State Committee in 1983 (Nagel, 1984).

Bills to implement AV have been introduced in several state legislatures (see section 1.2). In 1987, a bill to enact AV in certain statewide elections passed the Senate but not the House in North Dakota. In 1990, Oregon used AV in a statewide advisory referendum on school financing, which presented voters with five different options and allowed them to vote for as many as they wished (Wright, 1990).

In the late 1980s, AV was used in some competitive elections in countries in Eastern Europe and the Soviet Union, where it was effectively "disapproval voting," because voters were permitted to cross off names on ballots but not to vote for candidates (Shabad, 1987; Keller, 1987, 1988; White, 1989; Federal Election Commission, 1989). But this procedure is logically equivalent to AV. Candidates not crossed off are, in effect, approved of, although psychologically there is almost surely a difference between approving and disapproving of candidates.

With this information as background, I trace in section 1.3 my early involvement, and that of several associates, with AV. In section 1.4 I discuss how AV came to be adopted by the different societies.

In section 1.5 I report on empirical analyses of ballot data of some professional societies that adopted AV; they help to answer the question of when AV can make a difference in the outcome of an election. In section 1.6 I investigate the extent to which AV elects "lowest common denominators," which has concerned even supporters of AV. In section 1.7 I discuss whether voting is "ideological" under AV.

The confrontation between the theory underlying AV, which is rigorously developed in chapter 2, and practice offers some interesting lessons on "selling" new ideas. The rhetoric of AV supporters (I include myself), who have put

forward the kinds of arguments outlined in section 1.1, has been opposed not only by those supporting extant systems like plurality voting (PV)—including incumbents elected under PV—but also by those with competing ideas, particularly proponents of other voting systems like the Borda count and the Hare system of single transferable vote.

I conclude that academics probably are not the best sales people for two reasons: (1) they lack the skills and resources, including time, to market their ideas, even when they are practicable; and (2) they squabble among themselves. Because few if any ideas in the social sciences are certifiably "right" under all circumstances, squabbles may well be grounded in serious intellectual differences. Often, however, they are not.

1.3. EARLY HISTORY

In 1976, I was attracted by the concept of "negative voting" (NV), proposed in a brief essay by Boehm (1976) that was passed on to me by the late Oskar Morgenstern. Under NV, voters can either vote for one candidate or against one candidate, but they cannot do both. Independently, Robert J. Weber had begun working on AV (he was apparently the first to coin the term "approval voting").

When Weber and I met in the summer of 1976 at a workshop at Cornell University under the direction of William F. Lucas, it quickly became apparent that NV and AV are equivalent when there are three candidates. Under both systems, a voter can vote for just one candidate. Under NV, a voter who votes against one candidate has the same effect as a voter who votes for the other two candidates under AV. And voting for all three candidates under AV has the same effect as abstaining under both systems.

When there are four candidates, however, AV enables a voter better to express his or her preferences. While voting against one candidate under NV has the same effect as voting for the other three candidates under AV, there is no equivalent under NV for voting for two of the four candidates. More generally, under NV a voter can do everything that he or she can do under AV, but not vice versa, so AV affords voters more opportunity to express themselves.

Weber and I wrote up our results separately, as did three other analysts who worked independently on AV in the 1970s (discussed in Brams and Fishburn, 1983, 2007; see also Weber, 1995). But the *idea* of AV did not spring forth, full-blown, only about thirty years ago; its origins go back many centuries. Indeed, AV was actually used, beginning in the thirteenth century, in both Venice (Lines, 1986) and papal elections (Colomer and McLean, 1998); it was also used in elections in nineteenth-century England (G. Cox, 1987), among other places.

In the summer of 1977, Peter C. Fishburn, then at Pennsylvania State University and later at Bell Telephone Laboratories, and I met at a conference on Hilton Head Island, South Carolina, under the direction of James S. Coleman.

We then began a long collaboration, which resulted in one book (Brams and Fishburn, 1983, 2007) and many articles on AV and other voting procedures (Brams and Fishburn, 2002).

Our first article (Brams and Fishburn, 1978) was a formal analysis of the properties of AV that included, as an illustration, its application to the 1968 U.S. presidential election, in which there were three significant candidates (Richard M. Nixon, Hubert H. Humphrey, and George Wallace). Our analysis of this election was based on empirical research of my former Yale student, D. Roderick Kiewiet (1979), who showed that Nixon's popular-vote and electoral-vote victory in 1968 would have been much more substantial under AV than it was under PV.[2]

Even at this early stage AV generated academic controversy (Tullock, 1979; Brams and Fishburn, 1979), which I will say more about later. Nevertheless, Fishburn and I became convinced that AV is a simple and practicable election reform that could ameliorate, if not solve, serious problems in multicandidate elections.

I began a "campaign" in 1979 to get AV adopted in public elections, beginning with New Hampshire's first-in-the-nation presidential primaries in February 1980, which had multiple candidates running in both the Democratic and Republican primaries. Although my efforts received both national coverage (e.g., in the *New York Times* and *Los Angeles Times*) and local coverage in several New Hampshire newspapers (e.g., the *Manchester Union-Leader* and *Concord Monitor*), I was not successful in getting an AV bill out of committee, despite being a native of New Hampshire ("prodigal son returns"), testifying before Senate and House committees in New Hampshire's General Court (legislature), and meeting with the governor. Later testimony I gave before legislative committees in other states (e.g., New York and Vermont) was similarly unavailing in effecting reform.

The pros and cons of AV compared with other voting systems have been debated over the last twenty-five years in numerous publications.[3] But this is not the subject of this chapter, except insofar as showing how the rhetoric has influenced the history of adoptions (and nonadoptions) of AV.[4]

[2] For other retrospective studies of multicandidate elections, such as the 1992 presidential election involving Bill Clinton, George Bush, and Ross Perot (Brams and Merrill, 1994), see the citations in Brams and Fishburn (2002).

[3] For a sampling of this debate, see the exchanges between Arrington and Brenner (1984) and Brams and Fishburn (1984a); Niemi (1984, 1985) and Brams and Fishburn (1985); Saari and Van Newenhizen (1988a, b) and Brams, Fishburn, and Merrill (1988a, b); Brams and Fishburn (2001) and Saari (2001a); and Brams and Herschbach (2001a, 2001b) and Richie, Bouricius, and Macklin (2001). Recent popular accounts of the controversy over voting systems by science writers include MacKenzie (2000), Guterman (2002), Klarreich (2002), and Begley (2003).

[4] Donald G. Saari has been a proponent of the Borda count, most recently in Saari (2001b). But I know of no recent adoptions of the Borda count, though it and a variant have been used in two small Pacific Island countries, beginning about thirty years ago (Reilly, 2002). Proponents

1.4. THE ADOPTION DECISIONS IN THE SOCIETIES

Elections are not a burning issue in most scientific societies, with participation rates often considerably below 50 percent of the membership and sometimes closer to about 10 percent. For the candidates, on the other hand, who are often luminaries in their disciplines, outcomes are usually more consequential and sometimes represent, especially if the office is the presidency, recognition of professional achievements over one's career.

It is not surprising, then, that candidates are willing to make subdued versions of what, in political life, would be called campaign statements. In the more rarefied atmosphere of an academic or professional society, these statements, which usually accompany a mailed or an electronic ballot, tend more to emphasize broad goals than specific programs, although candidates often pledge to undertake new initiatives. Most candidates, while listing their past offices and qualifications for the new office, generally do not seek to disparage the opposition.

Genteel as most of these campaigns are, candidates do, nonetheless, try to garner support by highlighting their qualifications and proposing new approaches or ideas that differentiate them from their opponents. When AV was first proposed as a reform in the four societies that adopted AV in the late 1980s, no candidates or factions, with one major exception, identified AV as a threat either to their candidacies or points of view.

Of course, after AV's use, there are winners and losers, and some losers, undoubtedly, see themselves as victims of this reform. In one society (The Institute of Management Sciences, or TIMS, before it merged with the Operations Research Society of America, or ORSA, to become INFORMS), this logic worked in reverse: the winner under PV, before AV was adopted, would almost certainly have lost under AV—and this became an argument made for the adoption of AV!

I hasten to add that this argument against PV was not a personal argument directed against the PV winner. Rather, the argument was that another candidate commanded broader support and thereby "deserved" to win.

Next I briefly recount the adoption decisions of the first four societies to use AV.

1. *Mathematical Association of America (MAA).* In 1985, the president of the MAA, Lynn Arthur Steen, who was familiar with work on AV, asked the Board of Governors of the MAA to consider adoption of AV in its biennial

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of instant runoff voting (IRV), which is a voting system based on STV and supported by an organization, FairVote, recently succeeded in getting IRV enacted in elections in San Francisco and some other jurisdictions. As noted in Brams and Herschbach (2001b), IRV supporters have done little serious analysis to back up their claims, although other studies of STV (e.g., Dummett, 1984) have been more probing. On the other hand, FairVote does have human and monetary resources that few academics can match.

elections for president-elect and other national offices. After "heated but not acrimonious" debate (Steen, 1985), AV was approved by the board in 1985, passed by the membership in 1986, and used for the first time in the 1987 MAA elections.

Steen earlier had written an article in *Scientific American* (Gardner, 1980) on the mathematics of elections, in which he discussed AV. Before the MAA's consideration of AV, he asked me to look into the use of single transferable vote (STV) by the American Mathematical Society (AMS), the major research society of mathematicians.[5] I showed via two counterexamples that the "Instructions to Voters" accompanying the 1981 ballot used by the AMS to elect a nominating committee contained an erroneous statement about a property of STV (Brams, 1982a), which led to an exchange with Chandler Davis (1982), who had been a proponent of STV when it was adopted by the AMS several years earlier. The erroneous statement was deleted from future instructions, but AV was not adopted by the AMS until 1992.[6]

Both Steen's knowledge and his position as president of the MAA made him a crucial player in the MAA's adoption of AV. So, also, was Steen's successor as president of the MAA, Leonard Gillman, who was a strong advocate of AV and played an active role in its eventual implementation in the 1987 elections of the association. For example, he wrote a description of AV for mathematicians, which included results of his own analysis (Gillman, 1987).

2. *The Institute of Management Sciences (TIMS),* which is now part of INFORMS. The use of AV by TIMS in 1988 was preceded by an experiment in which members were sent a nonbinding AV ballot, along with the regular PV ballot, in the 1985 elections. Although the AV ballot did not count, 85 percent of the members who voted in these elections returned the AV ballot. This permitted Fishburn and Little (1988) to compare the results of voting under the two different systems.

On the basis of their empirical analysis, which will be discussed later, Fishburn and Little (1988) concluded that AV did a better job of electing Condorcet winners than did PV. Not only was the experiment "remarkably successful" (Little and Fishburn, 1986), but the results also convinced the council of TIMS to adopt AV in 1987, leading to its later adoption by INFORMS when it formed in 1995.

In fact, an argument for conducting the experiment in the first place was that management scientists should "practice what we preach" (Jarvis, 1984).

[5]The MAA is the more teaching oriented of the two major American mathematical societies at the college-university level.

[6]It was adopted in part because counting votes by hand under STV proved to be too onerous, and computerizing the counting was not feasible at the time. Even so, AV was adopted only for those offices of the AMS that did not require an amendment to the by-laws, which would have required considerable effort to enact; voting for other offices is still by PV (Daverman, 2002; and Fossum, 2002). Patently, pragmatic considerations played a key role in the AMS's choices.

Before deciding on its usage, TIMS decided to collect information it viewed as necessary to make an informed judgment about the applicability of the theoretical analysis of AV to its own elections.

Both the consideration and adoption of AV by TIMS were certainly helped by the fact that the president of TIMS in 1984–1985, John D. C. Little, was interested in AV and collaborated with Fishburn on the experiment and its analysis. Before undertaking the experiment, inquiries were made of the candidates to ask their permission to participate in it. Because of its research potential, all agreed, prefiguring AV's eventual adoption.

3. *American Statistical Association (ASA).* The former chair of the ASA's Committee on Elections, Richard F. Potthoff, had read about AV and brought it to the attention of his committee. This committee recommended its adoption first in internal ASA elections; the ASA Board of Directors approved this recommendation.

After AV's successful use in 1986 in three elections for council governors, the election of two editors to serve on the board, and the election of a board member to serve on the Executive Committee, the Committee on Elections recommended that AV be used in association-wide elections, which was approved by the board ("Amendment to ASA By-Laws," 1987) and ratified as an amendment in 1987. Unlike the other societies, the ASA has had no association-wide multicandidate elections since the adoption of AV, though some internal elections and single-winner section elections have had more than two candidates.

4. *Institute of Electrical and Electronics Engineers (IEEE).* The adoption of AV by the IEEE has a politically charged history (Brams and Nagel, 1991). Beginning in 1984, AV was considered, along with other voting systems, for possible use in multicandidate elections. But not until the 1986 elections—when a petition candidate, Irwin Feerst, ran against two candidates for president-elect who were nominated by the Board of Directors—did the issue of election reform take center stage. The reason is that Feerst, with 35 percent of the vote, defeated one of the two board-nominated candidates and came within 242 votes (of 52,405 cast) of defeating the other candidate. This result starkly illustrated to the board how vulnerable their nominees, who together might win a substantial majority in an election, are to a minority candidate if these nominees split the majority vote more or less evenly.

In 1987 the board reverted to nominating only one candidate for president-elect, breaking a tradition of nominating two candidates that it had begun in 1982. Feerst was instrumental in bringing the question of how many nominees the board must nominate to a vote of the entire membership in the 1987 election, in which he did not run and there were no other petition candidates. By a 57 percent majority, members supported a constitutional amendment requiring that the board nominate at least two candidates, but this fell short of the two-thirds majority needed to amend the IEEE's constitution.

Nevertheless, it was clear that there was strong member support for making IEEE elections more competitive, which renewed interest in AV when the board returned to nominating two candidates and allowed petition candidates to run as well. In 1987, I was invited by the then president of the IEEE, Henry L. Bachman, to attend an Executive Council meeting to discuss AV.

Unable to do so, I suggested that Jack H. Nagel of the University of Pennsylvania, who had done extensive research on AV, take my place. Nagel did; he also attended a later meeting of the full Board of Directors, which adopted AV in November 1987. (AV had previously been used in internal IEEE elections, sometimes in modified form.) With its adoption, the board voted to nominate at least two candidates for each office.

When the IEEE's adoption of AV was announced at a December 1987 IEEE press conference in New York City that Nagel and I attended, Feerst objected strenuously to its use, arguing that it was a deliberate move to undermine his candidacy and the interests of "working engineers," whom he claimed to represent. But when Feerst ran in 1988 for president-elect under AV, he came in fourth in a field of four candidates.

To recapitulate, the paths to adoption of AV in the different societies have been diverse. Only in the MAA did the full-scale use of AV begin before it was first tried out in an experiment (TIMS) or in internal elections (ASA and IEEE).

The presidents of the MAA, TIMS, and the IEEE played active roles in AV's adoption in their societies, and each received assistance from an advocate of AV. In the ASA, on the other hand, it was writings on AV that sparked initial interest, which turned into adoption without much controversy.

Controversy was the hallmark of the IEEE deliberations. While the IEEE's adoption of AV was in part a response to a perceived threat to its established leadership, it is important to realize that the IEEE did not view it as its only alternative.

In fact, several other voting systems had been considered before AV was selected. For example, a runoff election between the two top contenders, if neither received a majority in the initial balloting under PV, was also seriously considered, but it was viewed as too costly to have a second round of voting and also would have required a constitutional change. Ultimately, a majority of board members concluded that AV better fit the needs of the organization than any other voting system, and that is why it was adopted.[7]

This quick overview does not do justice to the serious debates that occurred over the merits of AV, particularly in the MAA and the IEEE. Indeed, although there has been dissent over AV's use in some societies (Kiely, 1991), no society that adopted AV ever rescinded its decision, with one notable

[7] By no means do I suggest that AV is a panacea in all elections, especially those involving multiple winners. For such elections, as I will argue in later chapters, other voting systems seem better suited.

exception (the IEEE).[8] Looking at what AV has wrought in the societies that adopted it may offer some explanation of why it has been generally, but not universally, accepted.

1.5. DOES AV MAKE A DIFFERENCE?

Clearly, a new voting procedure makes a difference if it leads to the selection of a different winner. The best evidence we have that AV would have elected a different winner is from the 1985 TIMS experiment, in which ballot data for both the PV official elections and the AV nonbinding elections were compared (Fishburn and Little, 1988).

In one of the three 1985 elections, the official PV and actual AV ballot totals are shown in Table 1.1 for candidates A, B, and C. Also shown are the AV totals extrapolated from the 85 percent sample of members who returned their AV nonbinding ballots, which is a very high figure. The extrapolation is a straightforward one: approval votes are added to the actual AV totals for each candidate based on the propensity of the sample respondents who voted for one particular candidate on the PV ballot to vote for each of the other candidates on the AV ballot. This extrapolation is justified by the finding that there were no major differences in voting patterns on the official PV ballot between AV respondents and nonrespondents.

Observe that candidate C wins the official PV election by a bare eight votes (0.4 percent), but B would have won under AV by a substantial 170 votes (6.2 percent). By itself, the fact that C wins more plurality votes and B wins more approval votes does not single out one candidate as the manifestly preferred choice. But on the experimental ballot, voters were asked one piece of additional information: to rank the candidates from best to worst by marking next to their names 1 for their first choice, 2 for their second choice, and so on.

These data can be used to reconstruct who would defeat whom in hypothetical pairwise contests, which is not evident from the PV totals. For example, the fact that C edges out B in presumed first choices, based on the PV totals, does not mean that C would hold his or her lead when the preferences of the 166 A voters are taken into account. In fact, the experimental ballots of these 166 voters show that

[8] According to the IEEE executive director, Daniel J. Senese, AV was abandoned in 2002 because "few of our members were using it and it was felt that it was no longer needed." I responded in an e-mail exchange (June 2, 2002) that because "candidates now can get on the ballot with 'relative ease' [according to former IEEE president Henry L. Bachman in the same e-mail exchange] . . . the problem of multiple candidates [in the late 1980s] might actually be exacerbated . . . and come back to haunt you [IEEE] some day." There may be other reasons for the abandonment of AV, but I was not privy to such information.

TABLE 1.1
PV and AV Vote Totals in 1985 TIMS Election

Candidates	Official PV	Actual AV	Extrapolated AV
A	166	417	486
B	827	1,038	1,224
C	835	908	1,054
Total	1,828	2,363	2,764
No. of Voters	1,828	1,567	1,828

1. 70 provided rankings in the order ABC.
2. 66 provided rankings in the order ACB.
3. 3 provided no rankings but approved both A and B.
4. 27 made no distinction between B and C by rankings or approval.

In the B-versus-C comparison, it is reasonable to credit (1) and (3) to B (73 votes), (2) to C (66 votes), and (4) to neither candidate. When added to the PV totals, these credits give C (901 votes) exactly one more vote than B (900 votes). However, assuming the 27 voters in (4) split their votes between B and C in the pattern of the 139 voters (70 + 66 + 3) who ranked A first and also expressed a preference between B and C, B would pick up an additional vote (rounded to the nearest vote), resulting in a 914–914 tie.

This extrapolation indicates that there is not a single *Condorcet winner*, who can defeat all other candidates in pairwise contests. The usual reason one does not exist is that there is a *Condorcet paradox*, whereby majorities cycle. To illustrate, if there are three voters with preferences for candidates {X, Y, Z} of (1) XYZ, (2) YZX, and (3) ZXY, two out of three voters (voters 1 and 3) prefer X to Y, two out of three (voters 1 and 2) prefer Y to Z, and two out of three (voters 2 and 3) prefer Z to Y, showing that there is no candidate that is preferred to all others. Instead, each candidate can be defeated by one other, so majorities cycle.

In this election, however, it is a projected tie that precludes one candidate from defeating the others in pairwise contests. That there is no cycle, and that A in fact would lose to both B and C, is shown by ranking data in Fishburn and Little (1988).

While surprising, the lack of a single Condorcet winner should not obscure the fact that 170 more voters approved of B rather than C in the extrapolated AV returns, albeit C won the PV contest by eight votes. The reason for this discrepancy between the AV and PV results is that whereas C has slightly more *stalwart* supporters (i.e., those who vote only for one candidate) than B, supporters of the third candidate, A, somewhat more approved of B than C (44 percent to 40 percent). But B's big boost comes from the fact that substantially

more of C's supporters approve of B than B's do of C, so B would have won handily under AV.

Is this desirable? In the absence of a Condorcet winner, Fishburn and Little (1988, pp. 559–560) concluded that "approval voting picks a clear winner on the basis of second choices. These show that B has a broader acceptance in the electorate than C. Therefore, the approval process, by eliciting more information from the voters, leads to the election of the candidate with the widest support." Although it is theoretically possible in close elections that the Condorcet winner will not be the most approved candidate, it rarely occurs.[9] However, the legitimacy of the AV winner may be questioned on other grounds.

1.6. DOES AV ELECT THE LOWEST COMMON DENOMINATOR?

One fear that has been expressed about the use of AV is that while it may help elect candidates more broadly representative than PV, these candidates could turn out to be rather bland and uninspiring. They may win simply because they offend the fewest voters, not because they excite the passions of many (Brams and Fishburn, 1988).

It is difficult to say whether, in principle, a compromise candidate is a better or worse social choice than a more extreme candidate who is the darling of some voters but the bane of others. In practice, fortunately, this dichotomous

[9]The 1999 election for president of the Social Choice and Welfare Society, which was decided by two approval votes among seventy-six cast, is one exception. The second-place AV candidate in this election would have defeated the AV winner by four votes in a head-to-head contest, based on candidate rankings. Brams and Fishburn (2001) deem this "nail-biting" election essentially a toss-up, whereas Saari (2001a) argues that most positional methods would have chosen the Condorcet winner (including the Borda count, wherein the Condorcet winner would have defeated the AV winner 60–59); see Laslier (2003) for more details on voting patterns in this election. A recent second exception, the 2006 election for president of the Public Choice Society, which was decided by one vote (Brams, Hansen, and Orrison, 2006), suggests that different Condorcet and AV winners are most likely in elections that are virtual dead heats. Regenwetter and Grofman (1998), using a random-utility model to reconstruct voter preferences in several elections—including some discussed here—show that winners under different voting systems almost always coincide. Laslier (2006) and Laslier and Vander Straeten (2003) analyzed data from a field experiment with AV in the 2002 French presidential election, which involved over 5,000 voters in two French towns, and conclude that AV was easily understood, readily accepted, and provided a more complete picture of the "political space." Baron, Altman, and Kroll (2005) show in a laboratory experiment that AV reduces parochialism, or bias toward one's own group. Earlier theoretical analyses as well as computer simulations (Brams and Fishburn, 1983; Lijphart and Grofman, 1984; Nurmi, 1987; Merrill, 1988) demonstrate that AV generally elects a Condorcet winner if there is one. If there is not one, as in the 1985 TIMS election experiment, then proponents of AV argue that AV provides a compelling way to resolve either a Condorcet paradox or a tie.

choice seems to arise rarely, as the data from the AV elections of the four societies demonstrate. Specifically, the winners under AV were candidates who were generally popular among *all* voters, however many candidates they voted for in the different elections. Thus, a divergence between forceful minority candidates, approved of by few, and "wishy-washy" majority candidates, approved of by many, is probably an infrequent event. But if elections are polarized, moderate voters under AV are likely to be decisive in swinging the outcome toward a less extreme candidate.

There are examples of elections in which the winner was not strong among all classes of voters. Consider the 1987 MAA election shown in Table 1.2 (Brams, 1988), wherein the votes received by the five candidates in this election are broken down by the votes each of the candidates received from voters who cast exactly one vote (1-voters), voters who cast exactly two votes (2-voters), and so on. Excluded from these totals are nine voters who voted for all the candidates, whose undifferentiated support obviously has no effect on the outcome.

In this election, 3,081 of the 3,924 voters (79 percent) were l-voters, while the remaining 843 voters cast l,956 votes, or an average of 2.3 votes each. Thus, the multiple voters cast 39 percent of the votes, though they constituted only 21 percent of the electorate.

Did the multiple voters make a difference? It would appear not, because the winner (A) received 28 percent more votes from 1-voters than the 1-voters' runner-up (D) did, just edged out B among 2-voters, but lost to several candidates among 3-voters and among 4-voters. A's victory, then, is largely attributable to the substantial margin received from l-voters, not from the presumably more lukewarm support that A received from multiple voters.

Define a candidate who wins among all classes of voters—those who cast few votes (narrow voters) and those who cast many votes (wide voters)—as *AV-superior.* In the MAA election, assume narrow voters are those who cast one or two votes, and wide voters are those who cast three or four votes.

TABLE 1.2
AV Vote Totals in 1987 MAA Election

Candidates	1-Voters	2-Voters	3-Voters	4-Voters	Total
A	848	276	122	21	1,267
B	618	275	127	32	1,052
C	652	264	134	34	1,084
D	660	273	118	31	1,082
E	303	132	87	30	552
Total	3,081	1,220	588	148	5,037
No. of Voters	3,081	610	196	37	3,924

It turns out that the winner, candidate A, is not AV-superior, because he or she wins among narrow but not among wide voters. Does this vitiate A's winning status? In winning so decisively among 1-voters, whose preference intensities would seem to be greatest, it would be hard to argue that A is any kind of lowest common denominator. It should be noted, however, that some of the thirty-seven voters who voted for four of the five candidates probably also had intense preferences—but against the one candidate they chose to leave off their approved lists.

In twelve of the sixteen multicandidate AV elections analyzed in the four societies, the winners were AV-superior. In the four elections in which there was not an AV-superior winner, the pattern is similar to that in the 1987 MAA election shown in Table 1.2: the winner won by virtue of receiving greater support among narrow voters than among wide voters. These AV-nonsuperior winners, therefore, do not fit the mold of lowest common denominators—the choice of many wide voters but few narrow voters—but rather the opposite, which reinforces, not undermines, their legitimacy as winners.

The fact that the winners in three-quarters of the elections were AV-superior is perhaps not surprising, because one would expect such candidates would do better than losers across different types of voters. A little reflection, however, shows that this need not be the case. Paradoxically, a candidate may lose among every possible class of voters—that is, be *AV-inferior*—and still be the AV winner. For example, A might be the victor over C among narrow voters, and B might be the victor over C among wide voters. But C could emerge as the AV winner if A did badly among wide voters, B did badly among narrow voters, but C was a close second among both types.

No winners in the sixteen elections were AV-inferior. As already noted, even the support of the four AV-nonsuperior winners appeared to be more intense and heartfelt (i.e., from narrow voters) than that of the losers, so AV does not appear to elect lowest common denominators.

1.7. IS VOTING IDEOLOGICAL?

Consider again the 1987 MAA election. As can be calculated from table 1.2, 2-voters gave the candidates 22–26 percent of all their votes, 3-voters 10–16 percent, and 4-voters 2–5 percent. Venn diagrams (not shown here) indicate the shared support among the ten subsets of two candidates, the ten subsets of three candidates, the five subsets of four candidates, and the set of all five candidates. Examination of the *sources* of this support, as shown in the Venn diagrams, does not reveal any particular pairs, triples, or quadruples that received unusually great support, indicating that there was no obvious coalitional voting for certain subsets.

On the contrary, multiple votes are spread about as one would expect according to the null hypothesis that votes are distributed in proportion to the candidates' totals. In the case of A, for example, there were eighty-two shared votes with just B, ninety-one with just C, eighty with just D, and twenty-three with just E, which is roughly in accord with the candidates' overall totals. Indeed, every one of the thirty-two subsets in this election—including the 2.6 percent who abstained—got at least three votes.

The story is very different for the 1988 IEEE election shown in Table 1.3 (Brams and Nagel, 1991), wherein the approval vote totals are shown for all sixteen subsets of the four candidates in this race. Consider first the 3-voters, and note that nearly everyone in this category voted for ABD—5,605 voters, to be precise. By contrast, only 148, 143, and 89 voters, respectively, supported the other 3-subsets of ABC, ACD, and BCD that contain C.

Evidently, the numerous supporters of ABD voted against C by voting for everybody except C. This essentially negative kind of voting against C can also be seen in voting for the six 2-subsets. The three 2-subsets that do not include C (AB, AD, and BD) had an average of 4,027 voters each, whereas the three that included C (AC, BC, and CD) had an average of only 897 voters each.

In addition to the predominant clustering of support around A, B, and D, there are some subtle differences in the sharing of support. For each pair of candidates, Brams and Nagel (1991) computed an index of shared support by taking the ratio of ballots approving of both candidates in each pair by 2-voters and 3-voters to total ballots, excluding abstentions and votes for all four candidates. By this measure, A and D have the most affinity, with 22.9 percent shared support. They are followed by A and B, with 17.2 percent; and then by

TABLE 1.3
Numbers of Voters Who Voted for 16 Different Subsets in 1988 IEEE Election and AV Total

Subsets					
		None = 1,100			
	A = 10,738	B = 6,561	C = 7,626	D = 8,521	
AB = 3,578	AC = 659	AD = 6,679	BC = 1,425	BD = 1,824	CD = 608
	ABC = 148	ABD = 5,605	ACD = 143	BCD = 89	
		All = 523			
Totals					
	A = 28,073	B = 19,753	C = 11,221	D = 23,992	

B and D, with 13.9 percent. Although A, B, and D share much less support with C, B at 3.l percent shares slightly more with C than do A (l.8 percent) and D (l.5 percent).

From these results, one might infer an underlying dimension on which D and C occupy opposite extremes, whereas A and B are located at intermediate positions. A is somewhat closer than B to D, but both B and A are much closer to D than to C, as shown in the following hypothetical continuum:

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|_____|_________|_____________________________________________|
D     A         B                                             C
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This representation corresponds to certain facts about the candidates. D and A were both board nominees, whereas C was a vociferous critic of IEEE officers, board, and staff. B, though like C a petition candidate, was in other ways close to the IEEE establishment, having previously served on the board. As for the slight distinction between D and A, judging from the candidates' biographies and statements it may reflect D's emphasis on technical research, which perhaps made D seem most distant from C, who sought to champion the working engineer.

Of the 54,204 ballots analyzed in this election, only 3,323 (6 percent) are "inconsistent" with the assumption that voters' preferences are based on the foregoing DABC ordering of candidates. *Inconsistent ballots* include approval of two nonadjacent candidates without including the adjacent candidate(s) between them, notably DC (608), AC (659), DAC (143), and DBC (89). Accounting for more than half the inconsistencies is the relatively minor inconsistency—in terms of perceived differences—represented by the pattern DB (l,824). Of the multiple voters, 17,435 (84 percent) cast ballots consistent with the hypothetical ordering.

Thus, candidates with obvious affinities tended disproportionately to share approval from multiple voters. In this sense voting was ideological: it reflected a pattern consistent with an underlying ordering of the candidates. Only in this election, however, was such a pattern found; far more typically, voting in the societies is nonideological, which is consistent with the null hypothesis alluded to earlier. But if AV is used in public elections, their more political character could well lead to the kind of ideological cleavages observed in the IEEE election—and the controversy that ensued.

It is important to note, however, that nonideological voting may mirror regularities not evident in the AV data themselves. As a case in point, the winner in the 1987 MAA election (Table 1.2) was a woman, and this pattern was repeated in the next MAA election in 1989. I have not analyzed data from the latter election, but the 1987 winner's victory, as shown earlier, cannot be impeached on grounds that she won mostly because of lukewarm support from wide voters. Nonetheless, because the female winners in 1987 and 1989 were the only women in each of the two races, it may be the case that they were

helped by their uniqueness: by some they were perceived as the single best choice; by others they were seen as broadly acceptable.

1.8. SUMMARY AND CONCLUSIONS

AV has proved to be a practical and viable election reform in the four scientific and engineering societies that used it for the first time in 1987 and 1988. While AV supporters played a role in its adoption in three of the four societies (TIMS, MAA, and IEEE), none of its proponents was even aware of its consideration in the fourth society (ASA) until its adoption was imminent.

In all these societies, AV's adoption rested principally on the arguments—summarized in section 1.1—that it is preferable to PV in multicandidate races. In the IEEE, a petition candidate's near-win with vocal but only minority support certainly gave urgency to these arguments, accelerating AV's adoption after the board's attempt to limit the number of board-nominated candidates to one person met with the membership's disapprobation. Only in the case of the AMS's 1992 adoption of AV did practical considerations give it an edge over STV, and then only in some elections that were relatively easy to change.

The empirical analyses of election returns from the different societies indicate that AV may make a difference. So far it seems not to have elected candidates who can be characterized as lowest common denominators but instead candidates who either enjoyed support among all classes of voters, or who did particularly well among narrow voters whose support I presume to be more intense. Although voting seems generally nonideological in most society elections, a clear ordering of positions was identified in the IEEE election, and voting tended to be only for adjacent candidates in this ordering.

Condorcet winners almost always win under AV, with the only known exceptions being the 1999 Social Choice and Welfare election and the 2006 Public Choice Society election, which were near ties. If there is no single Condorcet winner, as was illustrated in the 1985 TIMS election experiment, then AV provides a way of determining which candidate receives the most support from all voters, not just those who rank this person first.

Not all societies that have been approached about adopting AV, including two that I belong to—the American Political Science Association (APSA) and the International Studies Association (ISA)—have been amenable to election reform, much less the adoption of AV. Significantly, these societies are dominated, or heavily populated by, academic political scientists; none holds competitive elections unless a petition candidate challenges the official slate (this has never happened in the ISA; in the APSA, the last challenge to a presidential candidate occurred almost forty years ago).

Among the lessons I draw from my experience is that the adoption of AV, and probably any election reform, requires key support from within an organization.

I never received this kind of support from politicians or political parties in my attempts to get AV adopted in public elections. By contrast, the society adoptions would not have occurred without influential members of each society favoring reform, sometimes for practical or, in the case of the IEEE, political reasons. Of course, they also needed to make their cases with arguments based on democratic principles; I like to believe that both the rhetoric of AV supporters as well as their analyses helped in this regard.