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Scoring the Candidates

Range voting would prevent third-party spoilers--and give voters more say.

By Alan T. Sherman '87, Warren D. Smith '84, and Richard T. Carback III

In the 1995 women's figure-skating world championship, Chen Lu, Nicole Bobek, and Surya Bonaly were in first, second, and third place after they finished skating. Then 14-year-old Michelle Kwan surged into fourth with a strong showing in the free skate. In a bizarre twist attributed to an unusual new judging system, Kwan's strong performance caused Bonaly and Bobek to switch places. Bonaly got the silver, Bobek got the bronze, and Nobel Prize-winning economist Kenneth Arrow got even more vindication for his work on the drawbacks of rank-order voting.

In the 1950s, Arrow had argued that there is no "good" election method. His research focused on methods in which each voter lists some or all of the candidates in a strict linear order (first choice, second choice, etc.). Arrow proved that any such method must display at least one of the following unreasonable characteristics: (1) a "dictator" always decides who wins, regardless of how everybody else votes; (2) outcomes sometimes conflict with even unanimous electoral preferences; or (3) a seemingly irrelevant candidate changes the relative standing of two others.

The 1995 championship illustrated the third problem. Previously, judges scored skaters from 0 to 6, and the one with the highest average won. But that year, scores were used only to produce rank orders. Final standings were determined by a complex algorithm based largely on the number of times each skater was ranked first, second, third, and so forth. When some judges gave Kwan a higher score than Bobek, some of Bobek's rankings slipped. So even though her numeric scores didn't change, she was demoted to bronze.

Arrow's theorem could have predicted this oddity. But when he concluded that all election methods are inherently flawed, he had neglected an important fact: election methods do not have to be based on rank ordering.

Honeybees hold "elections" each year to choose a new location for their hive; bad decisions could lead to the colony's annihilation. Over 50 million years, natural

selection produced a system in which scout bees "score" each candidate site with dances describing the site's direction and distance. The more intense the dance, the greater the chance that other scouts will investigate the site. When a site attracts a sufficiently large majority of followers, it wins.

Sparta, the longest-lasting substantially democratic government in history, voted in a similar way from about 700 b.c.e. until at least 220 b.c.e. Spartans elected Gerontes and Ephors (council members who had the power to dethrone kings) by means of a shouting system. The candidate with the loudest support won.

Both the bees' system and the Spartans' are examples of range voting: each voter scores each candidate within a given range (say, 0 to 99); the one with the highest total wins. As John Harsanyi (also a Nobelist) observed when Arrow's research was published, range voting accomplishes what Arrow deemed impossible. But since his point went against 1950s economic gospel, it was ignored.

The current U.S. election method, in which voters name one--and only one--candidate, is called plurality voting. In elections with more than two candidates, plurality voting is one of the worst methods. Candidates with overlapping constituencies often split votes, causing a less popular candidate to win. For example, Ralph Nader's third-party campaign helped Bush defeat Gore in 2000. With Nader and Bob Barr organizing to be on as many states' ballots as possible in 2008, such danger looms again.

In the following hypothetical situation with 100 voters, 73 percent agree that Hitler is the worst choice. (For simplicity, we limited possible rank orders to four.) But with plurality voting, he wins:

# Voters	Voted for	True preference (best> good> bad> worst)
24	Castro	Castro> Obama> McCain> Hitler
26	McCain	McCain> Obama> Castro> Hitler
23	Obama	Obama> Castro> McCain> Hitler
27	Hitler	Hitler> McCain> Obama> Castro

Groups such as the FairVote Center for Voting and Democracy in Takoma Park, MD, advocate the Australian practice of instant-runoff voting (IRV). With IRV, voters rank the candidates explicitly. The candidate ranked first by the fewest voters is eliminated, and that candidate's votes transfer to the voters' second choices. This operation repeats

until just one candidate remains. In the example, Castro wins after IRV eliminates Obama (whose votes transfer to Castro), then McCain (whose votes transfer to Castro, since Obama has already been eliminated), and finally Hitler.

But IRV can also produce illogical outcomes. Here, even though 53 percent of voters--a clear majority--prefer McCain over Castro, Castro still wins. (Fifty-three percent of voters also rank McCain ahead of Obama, and 73 percent rank him ahead of Hitler.) For mathematical reasons that are difficult to explain, IRV artificially favors extremist candidates. And IRV shares another problem with plurality voting: each can motivate voters to lie.

With plurality voting, if the Obama supporters strategically voted for Castro, Castro would win--an outcome they would prefer to a Hitler victory. With either IRV or plurality voting, McCain voters might be better off pretending their favorite was Obama, thus heading off a Hitler or Castro win. But with range voting, each voter can express how much (or little) he or she likes each candidate, and it is never rational to give your favorite less than the top score. (Assigning two or more candidates the same score is permitted.) Applying 0-to-99 range voting to the previous example, the votes might be:

# Voters	range votes
24	Castro-99 Obama-90 McCain-30 Hitler-0
26	McCain-99 Obama-60 Castro-30 Hitler-0
23	Obama-99 Castro-90 McCain-30 Hitler-0
27	Hitler-99 McCain-0 Obama-0 Castro-0

Obama would win with 5,997, defeating Castro (5,226), McCain (3,984), and Hitler (2,673).

Warren Smith performed computer simulations using Bayesian regret analysis to compare election methods, measuring the quality of election outcomes by summing the utility--or satisfaction--of the voters. These simulations indicate that switching from plurality voting to range voting would improve election outcomes as much as switching from dictatorship to democracy would. Range voting also outperforms all common alternative systems on average--no matter how many honest, strategic, and uninformed voters cast their votes, and no matter how many candidates run. (See William Poundstone's Gaming the Vote for a good summary of this analysis.)

Range voting using a 0 to 9 scale can be done on existing computerized or lever voting machines, punch cards, or paper ballots. Voters would simply select a score for each candidate. In fact, French researchers found that voters make fewer errors on range ballots than they do on plurality ballots.

Changing the way the U.S. president is chosen may seem daunting, but plurality voting is a shaky foundation on which to rest the fate of the country. It doesn't let voters express how strongly they feel, which is a big drawback when some choices are much worse than others. Plagued by the prospect of spoilers and illogical outcomes, it perpetuates a two-party duopoly, minimizing democratic choice.

IRV can't fix the problems of plurality voting. But computer simulations, Spartans, and trillions of generations of honeybees offer convincing evidence that range voting can.

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Upcoming Events

AVS 55th International Symposium and Exhibition
Boston, MA
Sunday, October 19, 2008 - Friday, October 24, 2008
http://www2.avs.org/symposium

EmTech08
MIT Campus, Cambridge, MA
Tuesday, September 23, 2008 - Thursday, September 25, 2008
http://www.technologyreview.com/emtech/08/

Nano-Net 2008
Boston, MA
Monday, September 15, 2008 - Thursday, September 18, 2008
http://www.nanonets.org

NanoMedicine Summit

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How We Think Range Voting Would Have Affected the 2008 U.S. Presidential Race

By Alan T. Sherman '87, Warren D. Smith '84, and Richard T. Carback III

Spoilers and Vote Splitting

As we write at the beginning of July, Libertarian Party candidate Bob Barr is greatly feared by Republicans, and gleefully anticipated by Democrats, as a potential spoiler for John McCain in the general election. In "A Candidate Runs to a G.O.P. Chorus of 'Don't,'" an article that appeared on the front page of the *New York Times* on June 28, Barr summed up Republican complaints this way: "They all said, 'Look, we understand why you're doing this. We agree with why you're doing it. But please don't do it.'" As Barack Obama's campaign manager put it, "If Barr were to get 2 percent in most states, our belief is he'll get 4 percent here [in Georgia], most of it coming out of McCain's hide."

And the spoiler phenomenon may already have affected the primaries. Before quitting the race Mitt Romney claimed he would have defeated McCain for the GOP nomination if Mike Huckabee had not been in the race. In the New Hampshire primary, the presence of John Edwards helped Hillary Clinton defeat Obama. Had Edwards campaigned a little longer and harder, Clinton might have won the Democratic nomination.

Similar dynamics have affected the primaries before. In 1964, Republican Barry Goldwater lost the biggest landslide in U.S. history, to Democrat Lyndon B. Johnson. A GOP vote split had handed the Republican nomination to Goldwater instead of Pennsylvania governor William Scranton. A study by William R. Keech concluded that Scranton would have defeated every Republican rival head to head--defeating Goldwater, specifically, 60 to 34. Our analysis of Gallup polls indicates that Scranton would have fared better against Johnson.

With range voting, vote splitting is extremely unlikely since giving a high score to one candidate never prevents giving a high score to another as well.

Strategic Misvoting

In Operation Chaos, Republican radio ranter Rush Limbaugh organized what he called "dittoheads" to infiltrate the Indiana and North Carolina Democratic primaries and vote for Clinton, who he believed would represent a smaller threat to McCain in the subsequent election. Limbaugh and the Obama campaign both claimed that was the reason Clinton won Indiana. This example illustrates a problem with the U.S. system of primaries followed by a general election: voters can have an incentive to vote for those they detest instead of those they prefer. The same thing can happen with runoff voting.

Although range voting in the primaries would not solve the problem of Republican misvoting in a Democratic primary, range voting reduces incentives for other forms of dishonest voting. In particular it is *never* worthwhile to score your favorite below the top, and in a three-way race it is *never* worthwhile to rank one candidate strictly ahead of another if you actually think another is at least as good.

"Top-Two" Domination and Removal of Voter Choice

Over time, both plurality voting and instant-runoff voting (IRV) lead to two-party domination, leaving voters with fewer choices.

The final two nominees in the current presidential race, McCain and Obama, both support legal immunity for telecom companies alleged to have wiretapped, recorded, and stored millions of phone calls and e-mails in America as part of a massive warrantless wiretapping government program. (See the Electronic Frontier Foundation lawsuit for details.) McCain and Obama also repeatedly voted to allocate money for the Iraq War. Polls indicate that both stances are opposed by large majorities of Americans. But with plurality voting those Americans will have no effective way to express their sentiments by voting for an anti-immunity or antiwar candidate. Instead, they can only choose the candidate they see as the lesser of two evils. This has happened before: in 2004 the majority of the U.S. public was antiwar but had no antiwar candidate to support in the general election.

In the 2007 Australian elections, which used IRV for house seats, no third-party members won a house seat, though rank-order votes indicate that nine Greens apparently would have defeated every rival head to head.

The reason for this pathology of plurality voting is simple: votes for anybody besides one of the top two are probably going to be wasted. Knowing that, voters won't risk voting for anyone other than those two candidates. By contrast, range voting encourages diversity because it reduces the penalties for expressing true feelings.

Early-Cash Dominance and Related Insanity

The "must vote for one of the top two" mentality makes it extremely important for a candidate to appear to *be* one of the top two. That's accomplished by acquiring and conspicuously spending a tremendous amount of cash up front. Early in the Republican primary campaign, Mitt Romney spent a *million dollars* to win an unofficial straw poll in Davenport, IA. In a logical system, anybody wasting so much money on such an irrelevant event would be judged an incompetent decision maker, unfit to be president. But by *appearing* to be a front-runner, Romney induced voters to vote for him and donors to donate to his campaign--at least for a while.

Romney's maneuvers didn't end up determining the Republican nomination, but two of the most qualified and experienced Democratic candidates, Joseph Biden and Christopher Dodd, *dropped out* of the race after a poor showing in only one (comparatively small) state, Iowa. In a logical system, it would have been insane to drop out so early. But since they were not among the top two, they had no hope of donations or votes.

As a result of these problems, which give such undue influence to early donors, most of the country had no opportunity to express its opinion about most of the Democratic nominees. Voters were able to choose only among the perceived front-runners. This may have denied the Democratic Party its objectively best nominee, and the United States its objectively best president.

The root of these problems is that if plurality voters think X is best but has no chance to win, then they won't vote for X, and he or she really won't win. But if range voters think X is the best candidate, X will win even if everybody thinks he or she has little chance. That's why range voting makes it much less important to look like a front-runner--and greatly reduces the influence of money.

For more information, visit the Center for Range Voting.

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