Potential for odd election outcomes with ranked choice voting system, says mathematician

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Keith Devlin, Stanford mathematician with the Human-Sciences and Technologies Advanced Research Institute, lecturing. Credit: Stanford University

"Instant runoff" voting – which San Franciscans will use next week to choose their new mayor, county sheriff and district attorney – requires voters to rank their three top choices in each race, instead of simply voting for their first choice.

Advocates say instant runoff does a better than job of producing a winner who truly represents most of the voters' preference; opponents say the opposite. It all boils down to what you think of the math, which raises an obvious question: What does a mathematician think?

We posed the question to Stanford mathematician (and NPR Math Guy) Keith Devlin.

"There is no perfect voting method," said Devlin. "A famous 1950 result by the Nobel Prize–winning mathematician Kenneth Arrow, who spent much of his career at Stanford, tells us that there is no voting system that meets all basic democratic requirements.

"One advantage of the system we use in our national elections, the 'first past the post' method, is that it is easy to understand. Everyone votes for one candidate and the one with the most votes wins. But ease of understanding is about the only thing in its favor, and all the experts agree it is just about the worst possible system.

"For one thing, in a field with at least three candidates, split votes between two top candidates can result in a third person being elected who is disliked by a large majority of the electorate. Another problem is more social than numerical, in that it forces candidates into opposing camps, slugging it out in a verbal prizefight.

"That may have a lot to do with the current dysfunction in Washington," Devlin suggests, "where no one is willing to compromise or make deals."

The method being used in San Francisco is a variant of the "instant runoff" process, also known as "ranked choice" voting. Here, voters select their top three choices out of the field of candidates and rank them in order of preference. In the mayoral race this year, that means ranking three out of 16 contenders.

Tallying the votes

All the first choice votes are counted and then an iterative tallying process begins.

First, the contender with the lowest number of first-choice votes is dropped from the competition. Each voter who had ranked that candidate as their number one choice then has their vote given to whichever candidate they selected as their second choice. The votes are re-tallied and, as before, the contender with the lowest vote total is eliminated.

This process continues for as many rounds as needed until one candidate has over 50 percent of the votes tallied in a round, at which point he or she is declared the winner.

Costs vs. benefits

Advocates point out that this method can save costs. With the one-vote approach previously used in San Francisco, if no candidate received over 50 percent of the votes in the election, a special runoff election had to be held, entailing the expense of printing new ballots and paying poll workers. With the instant runoff approach, a second election is not needed.

Opponents of the method point out that voters whose choices are repeatedly eliminated effectively get to vote several times, and moreover the process gives equal value to a person's third-place ranking of a candidate and someone else's top-choice vote.

But there are other problems, Devlin points out. "For example, with ranked choice voting, you can get a winner who is the first choice of only a relatively small minority of the voters.

"Undesirable outcomes such as this can arise," he explains, "because the candidates are eliminated and their votes reassigned one after another, and the order in which that happens can make a huge difference.

"A shift of a large block of votes in an early round can eliminate a candidate who would have gone on to win had she survived until a later round and then picked up more votes to boost her tally."

In math, if it can happen, it will

Devlin's example is not a just theoretical possibility. In the 2010 race for supervisor in San Francisco's District 10, the eventual winner received just 11.8 percent of the first-place votes, ultimately edging out the candidate who had the most first-place votes, according to reports in the San Francisco Chronicle.

There is also Jean Quan's win over Don Perata last year for mayor of Oakland. Quan had only 24.4 percent of first-choice votes; Perata had 33.7 percent, the Chronicle reported.

The known vagaries of the voting method have resulted in some candidates trying new approaches to getting votes. For example, mayoral candidate Michela Alioto-Pier sent out a mailing urging voters to "please consider at least making Michela your number 2 choice for Mayor."

A mailing from the San Francisco Republican Party suggested two mayoral "candidates to avoid."

Devlin thinks that as candidates become more aware of the election math and the possibilities it opens up, more of these tactics are likely to be seen. "Particularly in the era of social media, where it is possible for large numbers of voters to coordinate their actions," he adds.

Is this a misuse of election math? Devlin does not think so. "Arrow's theorem tells us that the only mathematically ideal system is a dictatorship, and no American wants that."

It isn't rocket science

"So voting is not like physics or engineering, where we have to do what the math tells us. Rather, it is one of those cases where we can make the math work for us – to use it to achieve our own ends as a society. The voters will make the selection, but the math we choose can shape the kind of government we get. Do we want politics to be about partisanship and fighting, where half the electorate will always end up as losers and we just keep seesawing between the two, or do we encourage cooperation and compromise, where no one gets everything but everyone gets something?" Devlin says.

Devlin says that ranked choice voting now in use in San Francisco almost certainly encourages coalition building and reduces negative campaigning. "The question is, do you think that is a good thing? I have my opinion, but there I am being a citizen, not a mathematician."

Provided by Stanford University

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