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Disadvantages of Transferable Vote Systems

Abstract: Visually illustrates how systems such as AV/IRV penalize centrists and can often cause voters to hurt their own favourite candidates. Approval voting is a much simpler and more effective way to address the "spoiler" or vote-splitting problem.

ILLUSTRATING ELECTORAL SYSTEM BEHAVIOUR

In discussions comparing electoral systems, people often argue for one method or another by presenting examples of situations where a particular method fails or behaves strangely. However, individual special cases prove very little; such examples are usually carefully constructed to make a point, and may not represent the overall or likely behaviour of a particular electoral system.

A more substantive way to argue for or against a particular election method would be to compare how frequently problems occur, under what conditions they occur, and how severe they are. Mapping out how an electoral system behaves over a wide range of cases would allow us to ask questions like:

- How does the outcome change in response to a shift in public opinion?
- How does the system affect the balance of power between centrists and extremists?
- How does the system affect the balance of power between minor parties and major parties?

The images in this submission were created to illustrate these effects better and offer some insight into how electoral systems behave.

Each image shows, for a particular electoral system, how public opinion affects which candidate would win a single-winner election. Political opinion is represented by position. Each candidate and each voter occupies some location, and locations closer together represent opinions that are more similar. The independent variable is the average public opinion, which corresponds to a location in the image. Every point in the image is coloured to show the corresponding winner. For example, in Figure 1 there are three candidates, indicated by the small circles. This image conveys that the electoral method in

Figure 1. Map of winning regions when three candidates are positioned equidistant from each other.

question awards victory to Red when the average public opinion falls within the red region at the top, Green when the average public opinion falls in the green region on the lower left, and Blue when the average public opinion falls in the blue region on the lower right. This looks pretty fair to the candidates.
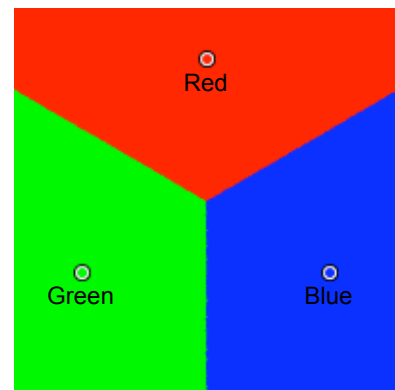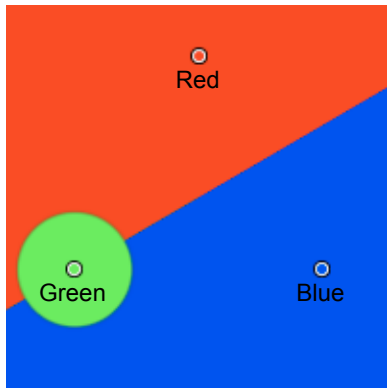
Figure 2. Map of winning regions for an imaginary unfair system.

Each image depicts the broader behaviour of an electoral system because it shows the outcomes of thousands of elections, not just one election. Figure 2 shows an imaginary unfair electoral system, biased against Green. If average public opinion fell within the green area, Green would still win the election; but the electoral system depicted here would hand the seat to Red or Blue in many cases (in the lower-left part of the diagram) where Green would be a better representative of public opinion. To put it another way, the imaginary electoral system in Figure 2 sets an unfairly high burden on Green, who has to campaign much harder than Red or Blue to have a chance of winning.

COMPARING ELECTORAL SYSTEMS

It would be natural to expect that a candidate should be elected when public opinion tends to agree with that candidate — but this is not always true, and the degree to which it is true depends on the electoral system. The three systems compared here are:

- **Plurality** (also known as First Past the Post): Each voter casts a single vote for their favourite candidate. The candidate with the most votes wins.
- **Alternative Vote** (also known as Instant Runoff or single-winner STV): Each voter ranks the candidates. Each ballot is assigned to its highest-ranked candidate; if a candidate has a majority of the ballots, that candidate wins. Otherwise, the candidate with the least ballots is eliminated from all the ballots, and each of that candidate's ballots are reassigned to the highest-ranked candidate still remaining. The elimination procedure repeats until a candidate has a majority of the ballots.
- **Approval**: Each voter casts a vote for as many candidates as they like. The candidate with the most votes wins.

When there are three candidates equidistant from each other, all three systems yield the same behaviour.
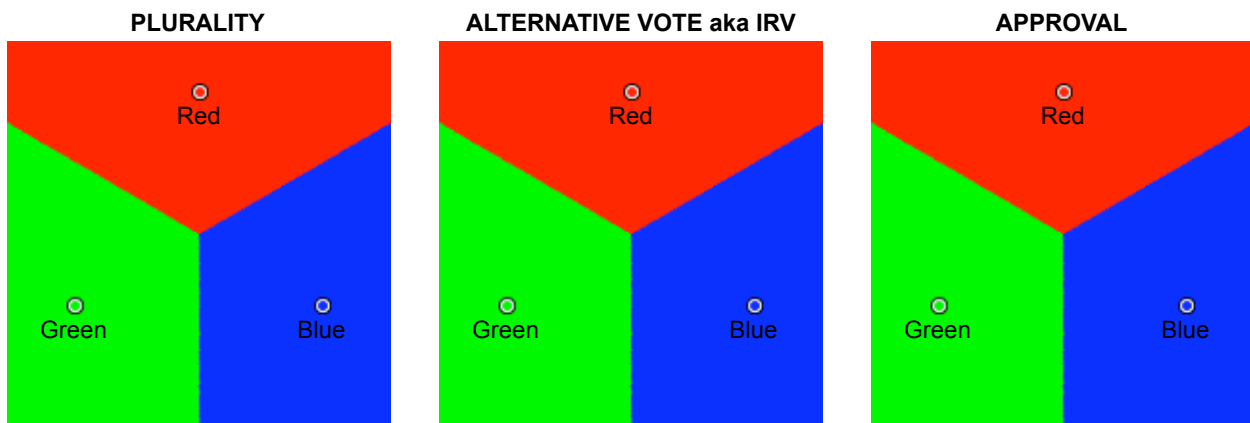

Figure 3. Behaviour of the Plurality method (also known as First Past the Post), the Alternative Vote (also known as Instant Runoff Voting or IRV), and Approval Voting with three candidates positioned equidistant from each other.

CENTRISTS AND EXTREMISTS

The three systems show different behaviour when the candidates are positioned in other ways. For example, consider the case where one candidate is positioned between the other two. How does the centrist fare, as compared to the two candidates on the extremes?

As Figure 4 shows, if the candidates are not too far apart, the centrist is severely penalized by Plurality or AV, but not Approval. In a Plurality election, Red takes all the voters on the left and Green takes all the voters on the right, squeezing out Blue who only gets a small group of voters in the middle. With AV, Blue has the fewest first-place votes and gets eliminated right away. But with Approval, voters near the middle can indicate their support for Blue as well as for other candidates, so Blue still has a fair chance.
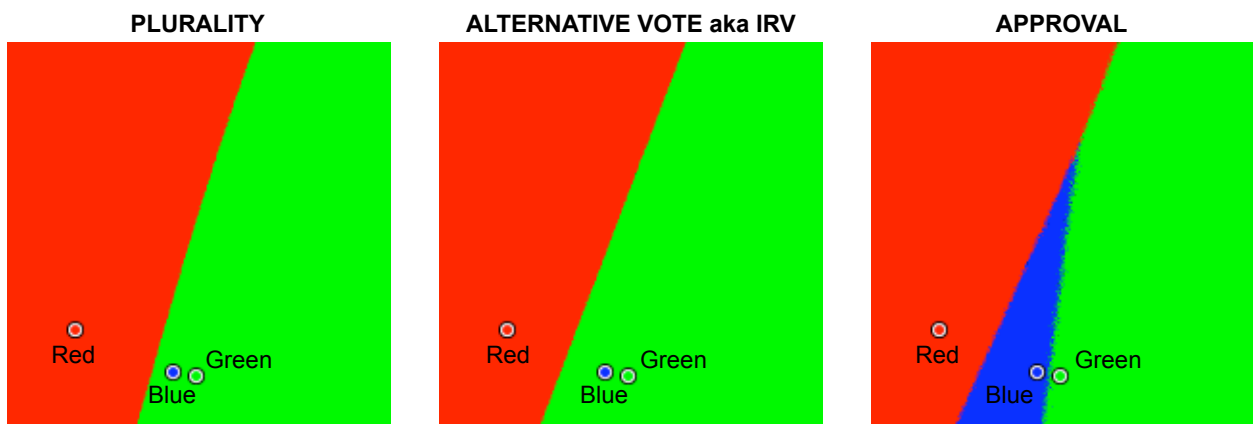
Figure 4. When Blue is positioned between Red and Green, the Plurality and Alternative Vote systems penalize the centrist, but Approval voting does not.

If the candidates are further apart, as in Figure 5, Plurality still penalizes the centrist (Red) heavily, while Approval voting still yields simple and fair winning regions. Alternative Vote does not penalize the centrist as much, but introduces a strange anomaly: if public opinion is near the black dot, where Green would have won, persuading more voters to agree with Green (black arrow) might cause Green to lose!
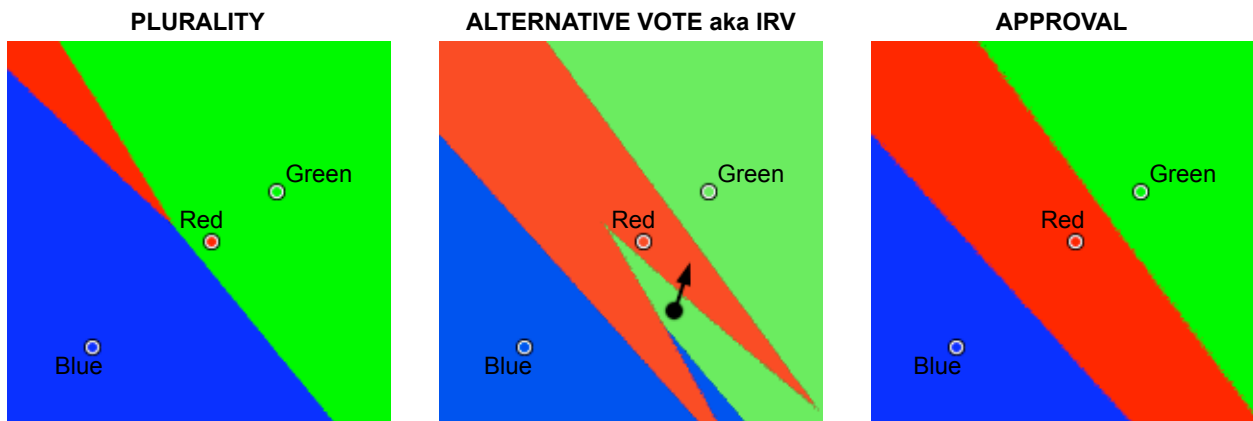
Figure 5. Red is positioned between Blue and Green; the candidates are further apart than in Figure 4. Plurality penalizes the centrist, but Approval voting does not. A paradoxical situation appears for Alternative Vote.

THE SPOILER EFFECT

Much voter frustration has been expressed about the "spoiler effect," in which the introduction of a third candidate "spoils" the race between two others in a Plurality election. One of the common motivations for introducing the Alternative Vote is to prevent this from happening. Does AV really eliminate the "spoiler effect"?

Mapping out the winning regions lets us visually illustrate what is happening in such a situation. The top row shows a two-candidate race between Blue and Green. The bottom row adds a Red candidate near Green, yielding different effects in the different electoral systems.
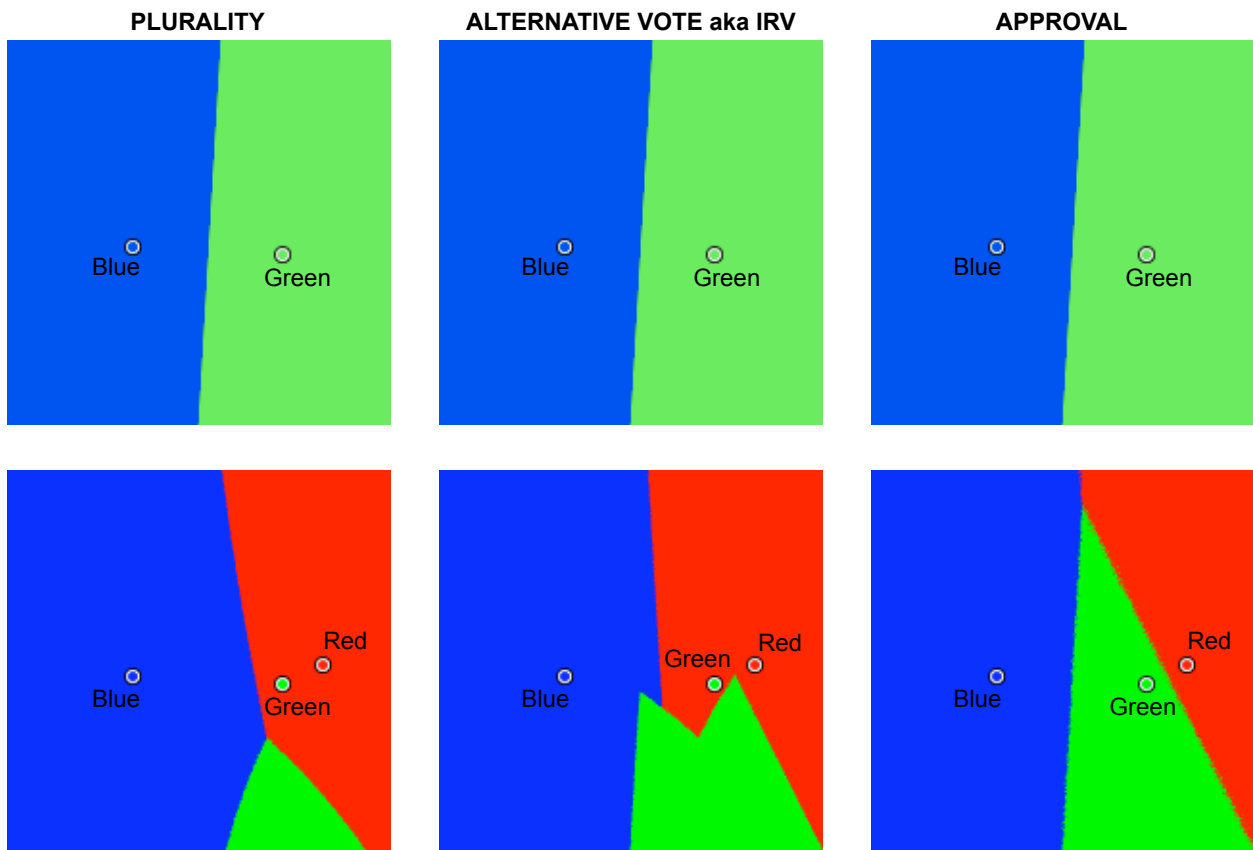

Figure 6. Addition of the Red candidate spoils the race between Blue and Green in a Plurality or Alternative Vote election, but not for Approval.

In a Plurality election, the introduction of the Red candidate gives Blue a big advantage: the Blue winning region expands significantly because Red and Green are "splitting the vote" — voters nearby divide up their voting power between Red and Green, which biases the election in favour of Blue. Green loses out. With the Alternative Vote, there remains a "spoiler effect" as the addition of Red still produces an advantage for Blue, though a smaller one. With the Approval system, the addition of the Red candidate creates a new standoff between Red and Green while leaving the race between Blue and Green unaffected, which is just as it should be — there is no "spoiler effect."

FOUR-CANDIDATE RACES

When there are four candidates running, electoral system behaviour becomes more complicated, but follows similar general trends. Plurality again gives the advantage to the Green and Blue candidates on the ends, and squeezes out Yellow and Red in the center. Alternative Vote yields an even more bizarre arrangement of winning regions, including two separate winning regions for Yellow. Finally, Approval gives simple, straightforward winning regions with a fair chance for each of the four candidates.
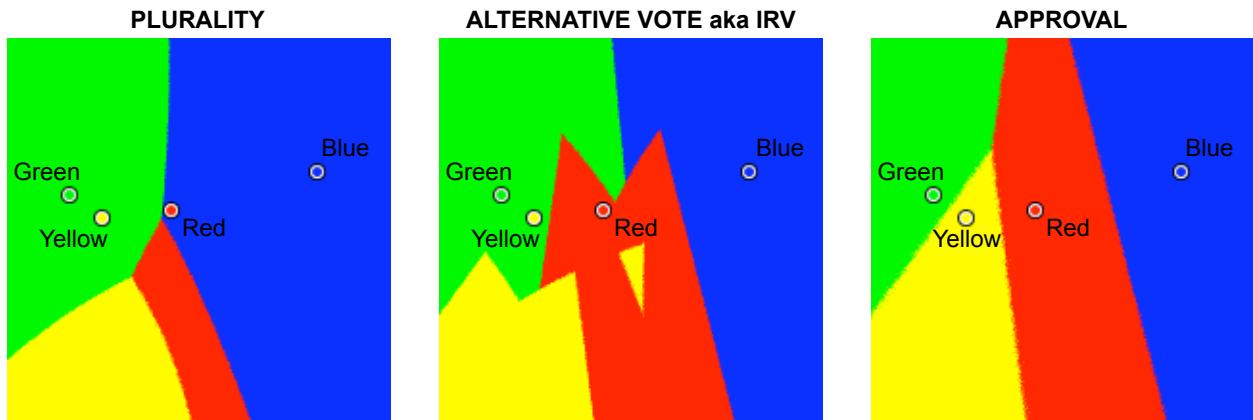

Figure 7. A four-candidate race. Plurality squeezes out Yellow and Red in the center, and Alternative Vote exhibits more strange behaviour.

IMPLICATIONS OF THESE RESULTS

Among a set of equally strong parties, Plurality unfairly penalizes those in the center and promotes a confrontation between two opposing extremes. This may be a contributing factor in the two-party lock on the United States government.

Alternative Vote is a complex system. It is the most complicated to explain and requires the most steps to carry out, and this is reflected in its uniquely strange and counterintuitive behaviour. Although it is often promoted as a solution to the "spoiler" problem, it does not eliminate the "spoiler effect." Under AV, with appreciable likelihood, **increased** public support can cause a candidate to **lose**.

STV is based on the same successive-elimination concept as Alternative Vote, but the STV procedure is even more complex. Although the visualization and analysis described here has not been applied to STV, there is no good reason to believe that STV will behave any simpler or more predictably than AV. If anything, it is reasonable to expect that the effects of campaigning for candidates or persuading voters to rank choices according to a particular strategy will be at least as difficult to predict and understand.

Approval voting is simple and yields a fair, straightforward, and predictable correspondence between public opinion and the outcome.

RECOMMENDATIONS

Based on the above analysis, I recommend the following:

- For single-winner elections, avoid the Alternative Vote. The cause-and-effect relationship between votes and outcomes is complex and often nonsensical.

- For single-winner elections, use Approval. It is simple to explain and easy to implement, it yields straightforward and fair behaviour, and it successfully avoids the "spoiler effect." It also allows multiple candidates from the same party to compete with each other without splitting the vote.

- The above recommendations apply both to single-winner elections as a system in their own right, as well as single-member districts that are part of a mixed electoral system.

- When considering ways to achieve proportional representation, avoid STV. The cause-and-effect relationship between votes and outcomes is almost certainly as bizarre as Alternative Vote, or more.

If proportional representation is deemed to be an important goal, a proposal that would follow naturally from these recommendations would be an mixed member proportional system with Approval voting for electing local candidates. Using open-list MMP and allowing multiple candidates from the same party in local elections would provide the accountability benefits of STV without STV's drawbacks.

Thank you for your attention to these concerns. Respectfully submitted,

Ka-Ping Yee

A NOTE ON THE DIAGRAMS

A complete explanation of how the diagrams were produced, with enough detail to compute and reproduce the figures exactly as shown here, is available online at `http://zesty.ca/voting/sim/`. These results have been successfully reproduced and verified by election researchers working independently (by Warren D. Smith, online at `http://rangevoting.org/IEVS/Pictures.html` and Brian Olson, online at `http://bolson.org/voting/sim_one_seat/`).

To produce each diagram, 200 000 voters are randomly scattered in a normal distribution around the point of average public opinion. The voters are assumed to vote their preference for nearer candidates over more distant candidates. These are simplistic assumptions that are not intended to match living, thinking voters. But observing electoral systems under these conditions shows us something about their behaviour. Under these simple assumptions any reasonable system ought to yield straightforward behaviour; real-world behaviour would only be more complex than what these simulations show.