The Will of the People: How we vote and why it matters

Jeanne N. Clelland
University of Colorado, Boulder

Voting Rights Data Institute
Tufts University

June 14, 2018
What are we talking about?

This talk is NOT about:
- Redistricting
- The Electoral College vs. the popular vote
- Voter Access
- Election integrity

This talk IS about:
- Elections where exactly one candidate must be selected
- How election procedures affect outcomes, sometimes in surprising ways

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Why have elections?

“The will of the people shall be the basis of the authority of government; this will shall be expressed in periodic and genuine elections which shall be by universal and equal suffrage and shall be held by secret vote or by equivalent free voting procedures.”

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How do we vote?

The classic system: Majority rules

The simplest elections feature a choice between two candidates, A and B. In this case, the procedure is straightforward: Every voter votes for their preferred candidate, and the candidate with the most votes wins.
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But as soon as there are 3 or more candidates, the situation gets more complicated! The most common voting systems in this case are:

- **Plurality voting:** Whichever candidate gets the most votes wins, even if their vote total is less than 50%.
- **Runoff elections:** If no candidate wins more than 50% of the vote, a second election is held between the two candidates with the two largest vote totals in the original election.
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**Simple example:** Suppose that 60% of the population likes both candidates $A$ and $B$ about equally, and dislikes candidate $C$. Meanwhile, the other 40% of the population prefers $C$ and dislikes both $A$ and $B$. 
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The initial election produces the following results:

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A : 32\%, \quad B : 28\%, \quad C : 40\%.
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With a plurality vote, C wins. But in a runoff election between A and C, most of B’s voters prefer A, and A wins.
Slightly more complicated example: Suppose that:

- 36% of the population strongly favors A, thinks B would be a reasonable second choice, and HATES C.
- 34% of the population strongly favors C, thinks B would be a reasonable second choice, and HATES A.
- 30% of the population strongly favors B and strongly dislikes both A and C, but about 2/3 of them prefer C vs. A as a second choice.

With a plurality vote, A wins with 36% of the vote. In a runoff election between A and C, C wins with 54% of the vote.

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  - 1992 Presidential election: Clinton 43%, Bush 38%, Perot 19%
  - 2000 Presidential election in Florida: Bush 48.85%, Gore 48.84%, Nader 1.6%
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For this reason, many attempts have been made to tweak the rules in order to improve the chances of electing more moderate candidates in primary elections, who it is hoped will fare better in the subsequent general elections.
Variations on the system

Blanket primary:
In this system, voters may select one candidate for each office without regard to party; for instance, a voter might select a Democratic candidate for governor and a Republican candidate for senator.

In the traditional version, the candidates for each office in each party with the highest numbers of votes advance to the general election as their party's nominee.

This system was used in Washington, California, and Alaska until the year 2000, when the Supreme Court ruled it unconstitutional in California Democratic Party v. Jones because it forced political parties to endorse candidates against their will.
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This system is currently in use for all statewide primaries except presidential primaries in Washington and California. A similar, but slightly different, system is also used in Louisiana.
Variations on the system

The idea is to promote the election of more moderate candidates, as candidates must appeal to members of both parties. It intentionally allows two members of the same party to advance to the general election, where members of the opposite party are likely to prefer the more moderate candidate.
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However, this can also occur when a party with minority support runs fewer candidates than the majority party and so has less vote-splitting between candidates.
For example, in Washington’s 2016 election for state treasurer, the primary results were as follows:

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<td>R</td>
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Democrats received 51.57% of the primary vote but were shut out of the general election.
Is there a better way?

As you might imagine, this is not a new problem! The obvious shortcoming of these standard voting systems is that voters are only allowed to provide partial information about their preferences: Each voter can vote for only one candidate and cannot say anything about their preferences among the rest. Many alternate systems have been proposed over the years in order to allow voters to express more nuanced opinions.
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The Borda Count

In 1770, the French mathematician Jean-Charles de Borda proposed the following algorithm: Suppose that there are \( N \) candidates. Each voter ranks the list of candidates in order of their preference. For each ballot, \( N \) points are given to the 1st place candidate, \( N - 1 \) points to the 2nd place candidate, etc., down to 1 point for the last-place candidate. (Alternatively, points may range from \( N - 1 \) down to 0.) After all points are tallied, the candidate with the most points wins.
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Today it is used in many academic and private institutions, and (with variations) even in a few political jurisdictions.
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Advantages:

- Tends to favor candidates who are more broadly acceptable to voters
- Somewhat less vulnerable to tactical manipulation by strategic ranking than other common methods

Disadvantages:

- It is possible that a candidate who is the first choice of a majority of voters is not the winner
- How to count ballots where not all candidates are ranked?
- Highly susceptible to a form of tactical manipulation called teaming or cloning

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In a standard election between these two candidates—or even a plurality election including one or two candidates with about 1% or 2% support each—\( A \) would win with more than 50% of the vote.

Now say that the Silvers decide to run a second, much less popular candidate \( C \), who will receive about 10% of the Silver vote. Then the ballots might be cast as follows. (Again, assume there are 100 voters.)
## The Borda Count

<table>
<thead>
<tr>
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<tbody>
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<td>36</td>
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<td>(C, B, A)</td>
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Even though C takes votes away from B, the mere presence of C in the election allows B to defeat A.
### The Borda Count

Ordered preferences | Votes
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Ranked Choice Voting (RCV)

Also known as "instant runoff voting," "preferential voting," or "transferable vote."

This algorithm was proposed in 1871 by the American architect William Robert Ware:

Each voter ranks the list of candidates in order of their preference.

In the first round, all 1st place votes are counted. If no candidates receive 50% of the vote, the candidate with the fewest votes is eliminated.

In the second round, all ballots whose 1st place candidate has been eliminated are reassigned to their 2nd place candidates.

The procedure is repeated until some candidate has at least 50% of the vote, and then that candidate wins the election.
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With 4 or more candidates, this system can produce different results from a standard runoff election.
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- RCV has been used for nationwide elections in Australia since 1918.
- In the U.K., the Labour Party and the Liberal Democrats use RCV to elect party leaders.
- Several U.S. cities (e.g., San Francisco, Minneapolis, and Portland, Maine) use RCV in mayoral elections.
In 2016, voters in Maine approved a referendum to implement ranked-choice voting for statewide elections. The state Supreme Court first ruled that this system violated the state constitution, but then reversed itself in April 2018. It was used for the first time this week in Maine’s primary election.
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Maine voters also affirmed this week (55% to 45%) that the state will continue using RCV, effective immediately.
### Instructions to Voters

To vote, fill in the oval like this ⬜

To rank your candidate choices, fill in the oval:
- In the 1st column for your 1st choice candidate.
- In the 2nd column for your 2nd choice candidate, and so on.

Continue until you have ranked as many or as few candidates as you like.

Fill in no more than one oval for each candidate or column.

To rank a write-in candidate, write the person’s name in the write-in space and fill in the oval for the ranking of your choice.

### Governor

<table>
<thead>
<tr>
<th></th>
<th>1st Choice</th>
<th>2nd Choice</th>
<th>3rd Choice</th>
<th>4th Choice</th>
<th>5th Choice</th>
</tr>
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<tbody>
<tr>
<td>Fredette, Kenneth Wade Newport</td>
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<td>0</td>
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<tr>
<td>Mason, Garrett Paul Lisbon</td>
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<td>0</td>
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<tr>
<td>Mayhew, Mary C. China</td>
<td>0</td>
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<tr>
<td>Moody, Shawn H. Garhart</td>
<td>0</td>
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</table>

### Rep. to the Legislature District 75

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<tbody>
<tr>
<td>Morris, Joshua K. Turner</td>
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<tr>
<td>Pope, John Alexander Turner</td>
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<td>Terrell, Angelo Turner</td>
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Turn Over for Additional Contests
Advantages:

- Reduces the impact of "spoiler" candidates, while still allowing voters to show support for minor candidates without "wasting" their vote.
- Easy to explain to voters, legislators, judges.
- Relatively resistant to tactical manipulation by strategic ranking.
- May inspire more positive campaigning, as candidates aim to become voters' second and third choices instead of attacking their opponents.

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Disadvantages:

Candidates who have broad support as a 2nd place choice may be eliminated early, as in our runoff example.

It is possible that a candidate who would win all head-to-head contests among the candidates may not win the election.

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A cautionary tale: The 2009 Burlington, VT mayoral election
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The 2009 mayoral election of Burlington, VT was conducted by RCV and featured 3 main candidates:

1. Kurt Wright (Republican)
2. Andy Montroll (Democrat)
3. Bob Kiss (Progressive, and the incumbent)
Excluding minor candidates who did not affect the vote, the ballot count was as follows:

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Second round tally: Kiss 4314, Wright 4064. So Kiss is elected.
But this seems a little bit strange! In head-to-head matchups:

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- 4067 voters preferred Montroll to Kiss, while 3477 preferred Kiss to Montroll.
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Incidentally, a Borda count (assuming ties for candidates not ranked) gives Montroll 18,425.5, Kiss 17,496, Wright 17,076.5.
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**Aftermath:** in 2010, Burlington repealed RCV by a vote of 52% to 48%.
Approval Voting

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Approval voting is used for internal elections by the Green Party in Texas and Ohio, the Libertarian Party in Texas, and the U.S. Modern Whig Party.
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Advantages:

Avoids the spoiler effect of plurality elections while still being quick and easy to calculate.
As with Borda count, tends to favor candidates with broad appeal.

Disadvantages:

Highly vulnerable to tactical manipulation by, e.g., only voting for one candidate (where it essentially reduces to plurality voting if enough voters do this).
It is possible that the winning candidate still has less than 50% approval, and so lacks a perceived mandate.
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Condorcet’s theory

In 1785, the French Mathematician Marquis Nicolas de Condorcet published a treatise called Essay on the Application of Analysis to the Probability of Majority Decisions, which includes the following major ideas:

Condorcet’s jury theorem: If each member of a voting group is more likely than not to make a correct decision, then the probability that the highest vote of the group is the correct decision increases as the number of group members increases.

Condorcet’s paradox: With 3 or more candidates, majority preferences can become intransitive: The electorate may prefer A to B, B to C, and C to A. (This is called a Condorcet cycle.)
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The treatise also outlines the **Condorcet method**, which is designed to simulate all pairwise elections between all candidates.
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For example, the voting procedure in Robert’s Rules of Order is a Condorcet method.
If some candidate would win all pairwise elections with all other candidates, that candidate is called the *Condorcet winner*. (But the existence of Condorcet cycles means that a Condorcet winner may not exist!)
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Condorcet disagreed strongly with Borda’s method, because it can fail to elect the Condorcet winner (if there is one).
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In his 1951 Ph.D. thesis, Kenneth Arrow proved the following theorem, which helped earn him the 1972 Nobel Prize in Economics:
Arrow’s Theorem: Consider the following conditions on a voting system:

1. Each voter’s rankings of the candidates forms a complete, strict, transitive ranking.
2. Pareto condition: If all voters share the same ranking of a pair of candidates, then the common ranking should be consistent with the election outcome.
3. Independence from irrelevant alternatives: If every voter’s preference between A and B remains unchanged, then the group ranking of A and B should remain unchanged, even if preferences involving other candidates (e.g., A vs. C) change.

The only procedure that satisfies these conditions is dictatorship.
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Don’t let the perfect be the enemy of the good!
For further reading:

- Donald Saari, *Chaotic Elections! A Mathematician Looks at Voting*
- Jordan Ellenberg, *How Not to Be Wrong: The Power of Mathematical Thinking*, Chapter 17: “There is no such thing as public opinion”