



Election Methods

Is It Possible to Choose the Winner?

Will Best

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- Draws heavily on...
 - A talk by Dr. Donald Saari
 - A presentation by Michael Buescher

Plurality

- Vote for your favorite candidate.
Whoever gets the most votes wins.
- Currently used: most American elections,
many other countries.

Plurality

- Advantages
 - Simple to vote
 - Simple to tally
- Disadvantages
 - Winner can have less than 50%
 - Susceptible to strategic voting
- Tends to create only two-party systems
 - Occasional “spoiler” candidates

Minnesota Gubernatorial Election, 1998



Jesse "The Body" Ventura (Reform): 37.0%

Norm Coleman (Republican): 34.3%

Hubert Humphrey III (Democrat): 28.1%

Hawaii Gubernatorial Election, 1994

Ben Cayetano 36.6%

Frank Fasi 30.7%

Pat Saiki 29.2%

Keoni Dudley 3.5%

(voter turnout just over 40%)

Non-majority Presidential winners

- 1992
 - Bill Clinton **43.0%**
 - George H.W. Bush 37.5%
 - Ross Perot 18.9%
- 2016
 - Donald Trump **45.9%**
 - Hilary Clinton 48.0%
 - Gary Johnson 3.3%
- 1996
 - Bill Clinton **49.2%**
 - Bob Dole 40.7%
 - Ross Perot 8.4%
- 2000
 - George W. Bush **47.9%**
 - Al Gore 48.4%
 - Ralph Nader 2.7%

American Presidential Elections

- Each state has a “popular vote” (plurality.)
- Winner of each state gets a set number of Electoral College votes.
 - Equal to # of reps + senators
 - DC gets 3
- Winner of majority of Electoral College votes becomes president.
 - Must be an absolute majority.
 - If not, the vote goes to the House, then the Senate.

2000 Presidential Election

States where winning candidate did not receive a majority of the vote

- Florida
- Iowa
- Maine
- Minnesota
- Nevada
- New Hampshire
- New Mexico
- Ohio
- Oregon
- Wisconsin

George W. Bush loses the popular vote, but wins the Electoral College vote and thus becomes President.

1992 Presidential Election

States where winning candidate did not receive a majority of the vote

- Alabama
- Alaska
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming

Top-Two Runoff

- Extension of a plurality election.
- If no one gets a majority, the top two have another election.
- Currently used: many European countries, Texas primary elections, others.
- Helps avoid dominance by only two parties (a little)

Borda Count

- Each voter ranks n choices.
- On each ballot, 1st choice gets n points, 2nd gets $n-1$ points, etc.
- Most points wins.
- Currently used:
 - sports polls and awards, private organizations

Borda Count

- Advantage:
 - More complete picture of voter preferences.
- Disadvantages:
 - More complicated
 - Susceptible to strategic voting
- Tends to elect broadly acceptable candidates

Instant Runoff Voting (IRV)

(Ranked Choice Voting)

- Voters rank candidates.
 - May not be required to rank all candidates.
- If one candidate has majority of 1st place votes, that's the winner.
- If not, remove the candidate with the fewest 1st place votes from all ballots, and count again.
- Repeat until someone has a majority of 1st place votes.

Instant Runoff Voting (IRV)

- Currently used: Australia, Fiji, Irish President, Maine, some American cities.
- Advantages:
 - More complete picture of voter preferences.
 - Protects against vote splitting (e.g. 1992, 2000).
 - Accomplishes runoff with only one round.
- Disadvantages:
 - Harder to understand/believe
 - Susceptible to strategic voting
- Compromise candidates get eliminated early

Condorcet

- Look at head-to-head preferences on each ballot.
- If one choice wins the head-to-head competition against all other choices, it's the winner.
- Currently used: some private organizations.

Condorcet

- Advantage:
 - A Condorcet winner is a clear favorite.
- Disadvantage:
 - There may not be a winner!
 - Susceptible to strategic voting

Arrow's Theorem

- Dr. Kenneth Arrow, 1951 (Ph.D. thesis)
 - Won Nobel Prize in Economics
- Discussed several reasonable-sounding criteria for a fair election involving three or more candidates in which all voters can freely choose.
- Proved a surprising theorem.

I. Majority Criterion (Pareto)

- If a majority of people prefer candidate A, then A should win.
- Pass: plurality, Condorcet, IRV
- Fail: Borda
- Electoral College also fails

2. Monotonicity Criterion

- If voters change their mind and rank candidate A higher than they used to, it should not hurt A.
- Pass: Condorcet, Borda, plurality, Electoral College
- Fail: IRV

2. Monotonicity Criterion

- How can IRV fail?

Preference		Voters
1st	2nd	
Right	Center	28
Right	Left	5
Left	Center	30
Left	Right	5
Center	Left	16
Center	Right	16

$$\} 33 + 16 = 49$$

$$\} 35 + 16 = 51 \text{ Left wins!}$$

$$\} -32$$

2. Monotonicity Criterion

- How can IRV fail?

Preference		Voters
1st	2nd	
Right	Center	28
Right	Left	3
Left	Center	30
Left	Right	7
Center	Left	16
Center	Right	16

} 31

} 37 +3 =40

} 32 +28 =60 Center wins!

3. Condorcet Criterion

- If candidate A is preferred in all head-to-head contests, then A should win.
- Pass: Condorcet
- Fail: Borda, plurality, IRV, Electoral College

4. Independence of Irrelevant Alternatives

- Adding or removing a non-winning candidate should not change the result.
- Pass: none!
- Fail: Condorcet, Borda, IRV, Plurality, Electoral College (1992, 2000)

France 2002

The Rules:

Vote for your favorite candidate. If no candidate receives a majority, there is a runoff between the top two vote-getters.

The Polls:

Widely expected: runoff between Jacques Chirac (incumbent) and Lionel Jospin; Jospin heavily favored to win the runoff.

First Round Results:

Jacques Chirac 19.9 %

Jean-Marie Le Pen 16.9 %

Lionel Jospin 16.2 %

Second Round Results:

Jacques Chirac 82.2%

Jean-Marie Le Pen 17.8%

Arrow's Theorem

- No voting system involving three or more candidates can satisfy all of these criteria!
- ...Except for a DICTATORSHIP (only one person votes)
- “Clear community-wide ranked preferences cannot be determined by converting individuals’ preferences from a fair ranked-voting electoral system”

Some Resources

- <http://wiki.electorama.com/>
- Saari, Donald G. *Chaotic Elections and Decisions and Elections*
- For a sample instant run-off vote (2000 election), see
<http://www.chrisgates.net/irv/>

Historical Election Data:

- <http://www.uselectionatlas.org/> -- a truly excellent site.
(red/blue is Democrat/Republican)