

How Should Members of Parliament (and Presidents) Be Elected?

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What's wrong with this picture?

2005 U.K. General Election

Constituency of Croyden Central

	<u>vote totals</u>
Andrew Pelling (Conservative)	19,974
Geraint Davies (Labour)	19,889
Jeremy Hargreaves (Liberal Democrat)	6,384
Others	2,700
Conservatives won seat	

- Conservatives won but with far less than majority of the votes:

Conservative	40.8%
Labour	40.6%
Liberal Democrat	13.0%
Others	5.6%

Why did this happen?

- Answer: Britain has first-past-the-post system (plurality rule)
 - each voter votes for one candidate
 - candidate with most votes wins (even if doesn't have majority)
- In Croyden, 9,084 voters (18.6%) couldn't express their preference between the Tory and Labour candidates (the only candidates with a serious chance of winning) since they voted for other candidates
- If they *had* been able to express their preference, then one of the serious candidates *would* have had a majority

- Indeed, good reason (e.g., exit polls) to think that large majority of Liberal Democrat voters would have gone for Davies, the incumbent Labour M.P., giving *him* the victory
- So Hargreaves, the Liberal Democrat, probably changed outcome of the Croyden election, even though had no chance of winning himself
- In 2005, Labour won overall election, so Croyden outcome didn't matter that much

But decisive influence of 3rd party candidates in overall outcome not rare in U.K.

Dramatic example in 1983:

- conservatives (under Margaret Thatcher) won huge victory (61% of seats)
- but won only 42% of vote
- collectively, Labour and the SDP-Liberal alliance won 53% of vote (substantial majority)
- fair to say that Alliance were *spoilers*
 - had no chance of forming government themselves (won only 3.5% of seats)
 - but mainly took votes away from Labour
 - i.e., Labour might well have won without Alliance
 - so Alliance very possibly changed outcome

Similar phenomenon in other countries:

- In 2002 French presidential election
 - nine candidates
 - most prominent were:
 - Jacques Chirac (incumbent)
 - Lionel Jospin (Socialist)
 - Jean-Marie Le Pen (National Front)

- France has runoff system
 - in first round, each voter votes for one candidate
 - if no candidate gets a majority, then top two vote-getters face each other in a runoff

- In 2002, top three candidates were

Chirac 19.9%

Le Pen 16.9% (big surprise)

Jospin 16.2%

- Chirac easily defeated Le Pen in run-off
- What's the problem with this outcome?
 - Evidence suggests Jospin would overwhelmingly win head-to-head contest with Le Pen
(so travesty to have Le Pen in run-off)
 - Jospin might well have beaten Chirac in head-to-head contest
- So Le Pen quite possibly changed outcome in France, even though far out of mainstream

Final example: 2000 U.S. Presidential election

- On morning after, Al Gore ahead of George W. Bush by 269 to 246 electoral votes, with only Florida undecided

Florida (25 electoral votes)

	<u>vote totals</u>	<u>vote percentages</u>
Bush	2,912,790	48.8%
Gore	2,912,253	48.8%
Nader	97,488	1.6%
Others	40,539	0.7%

- Bush declared the winner in Florida (and therefore of presidency)
- But overwhelming fraction of Nader voters preferred Gore to Bush
- So, Nader changed outcome of election
(and, of course, history too!)

In all these elections

- spoiler candidate/party had decisive effect on outcome
- in U.S., fact that more people preferred Gore than Bush (even then!)
 - created enormous bitterness against Bush
 - contributed to partisanship and polarization in U.S.

Is there a better way than first-past-the-post to elect British M.P.s and U.S. presidents?

- Answer: yes
- But first let's examine a common proposal that *doesn't* solve problem

Use *run-off* (supplementary vote) system

- can be implemented in one round (instant run-off)
- used in France; used to elect mayor of London; used in many American cities to elect local officials
- as we saw, such a system does *not* prevent an extremist candidate (Le Pen) from disrupting choice between the serious candidates

2005 Croyden, 2000 Florida and 2002 French elections show that first-past-post and run-off voting ignore critical information

- Labour candidate in Croyden (very likely) would have defeated Tory in head-to-head contest, but voting system could not take account of this
- similarly, Gore would almost certainly have defeated Bush in Florida head-to-head, but voting system did not even collect this datum

- Solution: should have voters provide *rankings* of candidates

e.g. Gore Bush
 Nader or Gore
 Bush Nader

- What should we do with these rankings?

“True” Majority Rule/Condorcet’s method (per Marquis de Condorcet)

- voters submit rankings
- elect candidate who (according to rankings) would beat all the others in head-to-head contests

For example, suppose Croyden voters' rankings break down as follows:

<u>13%</u>	<u>40%</u>	<u>40%</u>	<u>7%</u>
Lib. Dem.	Labour	Tory	U.K. Indep.
Labour	Tory	U.K. Indep.	Tory
Tory	Lib. Dem.	Labour	Labour
U.K. Indep.	U.K. Indep.	Lib. Dem.	Lib. Dem.

- Labour defeats Tory ($13\% + 40\% = 53\%$)
- Labour defeats Lib. Dem. ($40\% + 40\% + 7\% = 87\%$)
- Labour defeats U.K. Indep. ($13\% + 40\% = 53\%$)

Labour is true majority winner

How might true majority rule apply to 2002 French election?

<u>30%</u>	<u>36%</u>	<u>34%</u>
Jospin	Chirac	Le Pen
Chirac	Jospin	Jospin
Le Pen	Le Pen	Chirac

- If use French system of run-off between two leading vote-getters, Jospin is eliminated, and Chirac then beats Le Pen (66% to 34%)
- If (as in U.K.), everybody votes for just one candidate, and winner is candidate with most votes, Chirac wins
- If use true majority rule, Jospin beats Chirac (64% to 36%) and Le Pen (66% to 34%), so Jospin is the true majority winner

- Once voters submit *rankings*, many systems besides true majority rule become possible
- Why limit ourselves to majority rule?

Prominent alternative to majority rule:
Rank-Order Voting/Borda Count (per Jean-Charles Borda)

- if four candidates running, a candidate gets
 - 4 points each time some voter ranks him first
 - 3 points each time he is ranked second,
 - 2 points each time ranked third,
 - 1 point each time ranked last
- candidate with most points wins

Consider same population of Croyden voters as before (assume 50,000 voters in all)

<u>13%</u>	<u>40%</u>	<u>40%</u>	<u>7%</u>
Lib. Dem.	Labour	Tory	U.K. Indep.
Labour	Tory	U.K. Indep.	Tory
Tory	Lib. Dem.	Labour	Labour
U.K. Indep.	U.K. Indep.	Lib. Dem.	Lib. Dem.

- Labour's total: $4 \times 20K + 3 \times 6.5K + 2 \times 23.5K = 146.5K$
- Tory's total: $4 \times 20K + 3 \times 23.5K + 2 \times 6.5K = 163.5K$
- Tory is rank-order winner
- So true majority rule and rank-order voting lead to *different* outcomes

Which method is better?

- Way to answer question: which method does better job of satisfying some basic desiderata?

Consensus principle/Pareto principle

- if everyone agrees candidate A better than B, B won't be elected
- satisfied by both true majority rule and rank-order voting

One voter-one vote principle/anonymity principle

- all voters should count equally (doesn't matter who you are)
- violated by U.S. Electoral College system
- satisfied by true majority rule and rank-order voting

Neutrality

(i) electoral rules should treat all candidates equally (equal treatment)

(ii) which of candidates A and B wins should not depend on voters' views about candidate C (no spoiling)

- Both true majority and rank-order voting satisfy (i)
- True majority rule satisfies (ii) (because always compare just 2 candidates at a time)
- But rank-order voting violates (ii)

<u>13%</u>	<u>40%</u>	<u>40%</u>	<u>7%</u>	
Lib. Dem.	Labour	Tory	U.K. Indep.	
Labour	Tory	U.K. Indep.	Tory	Tory wins
Tory	Lib. Dem.	Labour	Labour	
U.K. Indep.	U.K. Indep.	Lib. Dem.	Lib. Dem.	

40%

Tory

Labour

U.K. Indep.

Lib. Dem.

Labour wins

So far, true majority rule fares better than rank-order voting

- both satisfy consensus and anonymity but only majority rule satisfies neutrality

But majority rule has a flaw

- There may not always be a candidate that beats all the others

<u>35%</u>	<u>33%</u>	<u>32%</u>
Labour	Tory	Lib. Dem.
Tory	Lib. Dem.	Labour
Lib. Dem.	Labour	Tory

Labour beats Tory (67% to 33%)

Tory beats Liberal Democrat (68% to 32%)

But Liberal Democrat beats Labour! (65% to 35%)

- this is called a *Condorcet cycle*
- majority rule violates *transitivity principle*
(if A chosen over B, B chosen over C,
then A chosen over C)
- rank-order voting satisfies transitivity

- So true majority rule satisfies

consensus

anonymity

neutrality

- Rank-order voting satisfies

consensus

anonymity

transitivity

Does any voting method satisfy all four principles?

consensus

anonymity

neutrality

transitivity

Answer: No

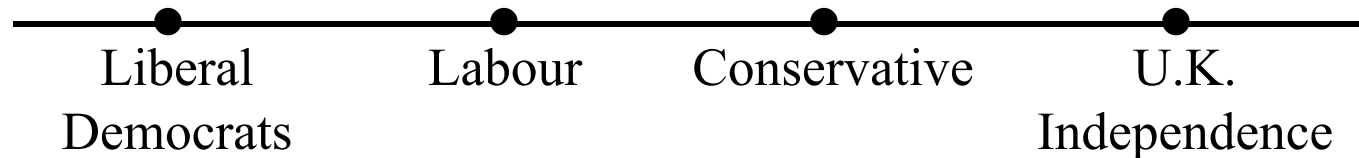
- implied by Arrow's Impossibility Theorem

But Arrow's theorem *too* negative

- insists electoral method must work for *any* rankings that voters could have
- but some rankings may be quite unlikely

For example, for many voters, ideology important

- In 2005 election, had



- Ideological voter ranks candidates according to their ideological distance from favourite
- Ideology rules out ranking
 - Conservative
 - Liberal Democrat
 - U.K. Independent
 - Labour
- if most voters' rankings are ideological, then true majority rule *is* transitive
 - Black's theorem

- Other restrictions on rankings can also ensure transitivity
 - Define a voting method to *work well* for restricted class of rankings if it satisfies consensus, anonymity, neutrality, and transitivity when voters' rankings drawn from that class
- (e.g., true majority rule works well for the class of ideological rankings)

Dasgupta-Maskin Majority Domination Theorem:

- if a voting method works well for some particular class of rankings, then true majority rule *also* works well for that class
- furthermore, there exists some class of rankings for which true majority rule works well but other voting method does *not*
- thus, true majority rule works well *more often* than any other method

- Thus, there is precise sense in which true majority rule is best voting method
 - Actually, true majority rule not always well-defined
 - May be no candidate who beats all others in head-to-head contests (Condorcet cycle)
 - If not, among those candidates who beat the most opponents, can choose as winner one with highest rank-order score
- several other common ways of breaking tie

Virtues of True Majority Rule

- prevents *minority winners* whenever possible (majority prefers some other candidate to winner)
- helps prevent spoiler candidates or parties from changing election outcome (candidate who can't win himself determines who wins)
- allows voters to register protest without handing election to ideological foe
 - in 1983 election, could have voted for SDP without ensuing Tory victory
- most *robust rule*: satisfies consensus, anonymity, neutrality, and transitivity more often than any other method
- simpler reform than going over to *proportional representation*
 - under PR, local constituencies *eliminated*
 - number of seats party gets in Parliament proportional to its total national vote
 - philosophically very different from first-past-the-post