Fair Division in Theory and Practice

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Lecture 5b: "Alternative Voting Systems"

Increasing minority representation

- Public bodies (juries, legislatures, police forces) more legitimate if they include more than one segment of society
- Three principal approaches to bringing about minority representation in elected political bodies
  - "Wishful thinking"
  - Majority-minority (territorial) districting
  - Alternative ("semi-proportional") voting systems: Cumulative voting, limited voting, and transferable voting

"Wishful Thinking"

- Based on argument that problems of minority representation are working themselves out
- Empirically, "safe" black districts (with $> 50\%$ black voting age populations) almost universally necessary to elect black candidates
- (In 1995 at least) probability of a majority white district electing a minority congressperson was less than 1%

Race-conscious districting

- The main tool for ensuring minority representation in Congress
- Limited in its potential scope because of geographic constraints
  - More aggressive gerrymandering for racial purposes legitimizes practice for other purposes
- Institutionalizes *race* as the primary dimension of conflict between voters
- Necessarily puts "filler people" into safe districts, as vote packing is illegal

"Semi-proportional" systems

- These systems use a larger district magnitude (2 or more seats) and a candidate-based ballot to attain proportional outcomes with a non-PR formula
- Goal is to fragment voting power of electoral majorities to enable minorities to gain one or more seats
- They don't subdivide electorate along racial lines, or concentrate voters into "safe" districts
- They enable many minority viewpoints to gain representation (race, gender, geographic)

Potential pitfalls

- Could facilitate the election of extremist of marginal political groups (e.g. white supremacists)
- Could be too expensive for less wealthy candidates to campaign in a much larger district
- Could undermine connection between voters and "their" representative

Alternative voting systems

Block vote: DM>1

- Voters given # votes equal to # seats. Can allocate one vote to as many or as few candidates as they want
- Reduces proportionality in practice, as people vote party ticket
- Voting system used in Ferguson school board elections

Limited vote: DM>1

- Similar to block, but voters allocated # votes less than # seats
- Called "single non-transferable vote" (SNTV) when voters are given 1 vote
- Reduces chance for large party to elect full slate of their candidates

Block Vote

#People	Preferences
10	$A \sim B \succ C$
6	$C \succ B \sim A$
Totals:	**A:10**; **B:10**; C:6

Limited Vote

#People	Preferences
10	$A \sim B \succ C$
6	$C \succ B \sim A$
Totals:	**A:7**; B:3; **C:6**

Example: 3 candidates running for 2 seats.

A, B are in the same party while C is in a different party

Cumulative vote: DM>1

- Voters get # votes=# seats, but can cast more than one vote per candidate
- Allows voters to reveal an intensity of preference, though is easily manipulable
- Any coordinated voting bloc with $\frac{1}{N+1}$ of the population (plus 1 more voter, to break a tie) can win a seat

  Example: If there are 5 seats to be distributed then any set of voters comprising over 16.6% of the population can win a seat

Cumulative Vote

#People	Preferences
10	$A \sim B \succ C$
6	$C \succ B \sim A$
Totals:	**A:13**; B:7; **C:12**

Limited Vote

#People	Preferences
10	$A \sim B \succ C$
6	$C \succ B \sim A$
Totals:	**A:7**; B:3; **C:6**

For cumulative voting, suppose that the 6 voters place all their votes on C. Regardless of how the 10 voters divide their votes between A and B, C is guaranteed a seat.

The Alternative Vote (instant runoff)

- DM=1 (not proportional)
- Voters rank candidates (ordinal ballot)
- If no candidate receives a majority, candidate with least # of first-place rankings is eliminated
- Each of that candidate's votes is transferred to whomever the voter ranked second on that ballot
- Process is repeated until a candidate receives greater than 50% of the votes
- Used to elect Australian House, Irish president, currently in many U.S. municipalities

Alternative vote example

% Votes	Ballot ranking
30	$A > B > C$
25	$B > A > C$
45	$C > B > A$

- B is eliminated in first round of counting
- B's votes are transferred to A
- A wins with 55% of the vote

Non-monotonicity

Instant runoff (and runoff systems in general) do not satisfy a very weak monotonicity condition (i.e. a condition that most rules *do* satisfy)

% Voters	Profile 1	Profile 2
30	C A B D	C A B D
27	A C B D	A C B D
19	B C D A	C B D A
24	B A C D	B A C D

Single transferable vote

- Works essentially the same way, but DM>1 (semi-proportional)
- First, *Droop Quota* is calculated:

$$\text{Droop}= \frac{\text{Total \# Valid Votes}}{\text{Total \# Seats} + 1} + 1$$

- Ballots are sorted according to 1st preferences
- Candidates meeting Droop Quota are elected, their *surplus* votes are transferred to 2nd ranked candidates on those ballots
- If no one meets Droop Quota, lowest candidate eliminated and votes are transferred (like the AV)

Why the Droop Quota is good

Mathematically it's the smallest integer that ensures that exactly the right number of candidates are elected

Ex: With 100 voters and 2 seats Droop $= \frac{100}{2+1} + 1 = 34$ (note that you drop any remainders)

Ex: With 100 voters and 3 seats Droop $= \frac{100}{3+1} + 1 = 26$

What is the Droop Quota when there are 100 voters and 1 seat?

Example: 100 voters, 6 candidates, DM=4

Voters	1st Rank	2nd Rank	3rd Rank	4th Rank	5th Rank	6th Rank
42	A	C	E	F	D	B
22	F	D	B	A	E	C
18	D	B	A	F	E	C
18	B	A	F	E	C	D

What is the Droop quota in this example?

Voters	1st Rank	2nd Rank	3rd Rank	4th Rank	5th Rank	6th Rank
42	A	C	E	F	D	B
22	F	D	B	A	E	C
18	D	B	A	F	E	C
18	B	A	F	E	C	D

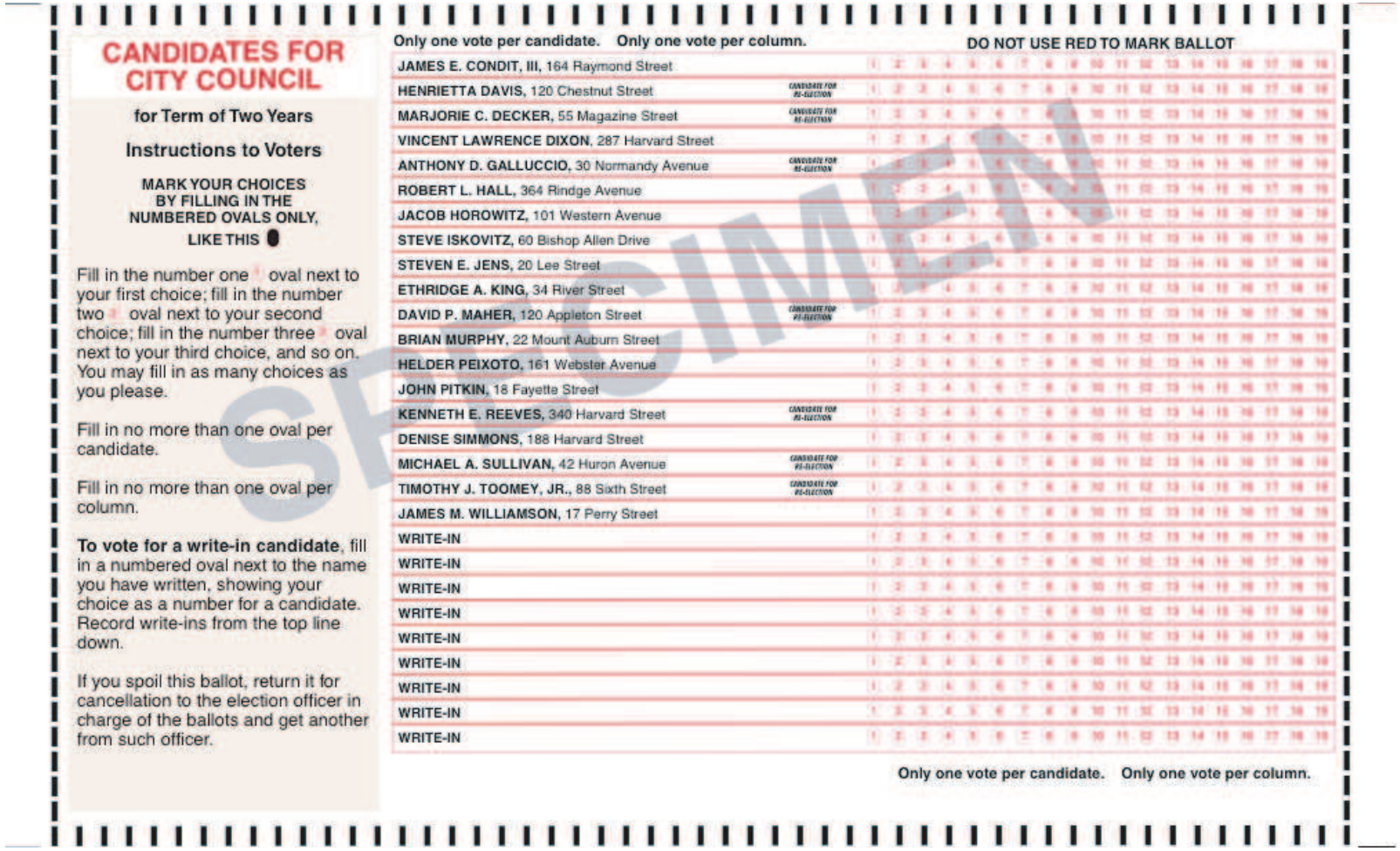
- Droop =21
- A and F win seats
- 21 votes transfered to C; 1 vote transferred to D
- C wins a seat, no votes transferred
- E is dropped; B is dropped, votes transferred to D
- D wins last seat with 37 votes

Why the Alternative Vote and STV are becoming increasingly popular

- Voters can express a range of preference
- Voting occurs on a single day; elections with lowest turnout eliminated (i.e. second round elections)
- Candidates can be similar with less fear of diluting their vote
- Small parties can influence agenda without winning seats; can encourage their members to rank mainstream candidates in certain ways
- Supporters claim it reduces negative campaigning

Problems with these methods

- Counting process is complicated, and an element of chance can be involved
- They're non-monotonic: moving a candidate up on a ballot can cause that candidate to lose
- They require a high degree of voter rationality / thought
- As DM increases, so does ballot length
- They're highly prone to *primacy effects* (ballot sequence really matters)


CANDIDATES FOR CITY COUNCIL
for Term of Two Years
Instructions to Voters
MARK YOUR CHOICES BY FILLING IN THE NUMBERED OVALS ONLY, LIKE THIS
Fill in the number one oval next to your first choice; fill in the number two oval next to your second choice; fill in the number three oval next to your third choice, and so on. You may fill in as many choices as you please.
Fill in no more than one oval per candidate.
Fill in no more than one oval per column.
To vote for a write-in candidate, fill in a numbered oval next to the name you have written, showing your choice as a number for a candidate. Record write-ins from the top line down.
If you spoil this ballot, return it for cancellation to the election officer in charge of the ballots and get another from such officer.
Only one vote per candidate. Only one vote per column.
DO NOT USE RED TO MARK BALLOT
JAMES E. CONDIT, III, 164 Raymond Street
HENRIETTA DAVIS, 120 Chestnut Street
MARJORIE C. DECKER, 55 Magazine Street
VINCENT LAWRENCE DIXON, 287 Harvard Street
ANTHONY D. GALLUCCIO, 30 Normandy Avenue
ROBERT L. HALL, 364 Rindge Avenue
JACOB HOROWITZ, 101 Western Avenue
STEVE ISKOVITZ, 60 Bishop Allen Drive
STEVEN E. JENS, 20 Lee Street
ETHRIDGE A. KING, 34 River Street
DAVID P. MAHER, 120 Appleton Street
BRIAN MURPHY, 22 Mount Auburn Street
HELDER PEIXOTO, 161 Webster Avenue
JOHN PITKIN, 18 Fayette Street
KENNETH E. REEVES, 340 Harvard Street
DENISE SIMMONS, 188 Harvard Street
MICHAEL A. SULLIVAN, 42 Huron Avenue
TIMOTHY J. TOOMEY, JR., 88 Sixth Street
JAMES M. WILLIAMSON, 17 Perry Street
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
WRITE-IN
Only one vote per candidate. Only one vote per column.
SPECIMEN

An example of primacy effects in Compton CA, 2001

- Compton uses a runoff electoral system
- In 2001 the Compton City Clerk failed to correctly randomize the names of candidates on the runoff ballot (used same order as primary)
- Incumbent Bradley was listed second on runoff ballot; challenger Perrodin was listed first and won by 261 votes
- Jon Krosnik's expert testimony for Bradley convinced a court to throw out election results and reinstate Bradley
- Perrodin won on appeal; was Compton's longest-serving mayor (2001-2013)

Issues in ballot design

(See "Ballot Design Options," R. Michael Alvarez, "The Effects of Ballot Position on Election Outcomes," Koppell & Steen, JOP)

There is enormous variation in ballot-design procedures

- In CA alone, state election code provides strict rules for
  - *randomization* and *rotation* of candidate names on statewide ballots (rotation by Assembly district)
  - randomization and *limited rotation* of candidate names on state legislative ballots (rotation occurs only if district crosses a county line)
  - and only randomization for local races

Costs to name rotation on ballots

- Makes it impossible to print sample ballots for voters
  - Some jurisdictions legally require that a ballot facsimile that exactly reproduces the actual ballot is distributed to voters beforehand
- Is simply more expensive, and provides more opportunities for misprints, etc.

Electronic voting could rotate candidate names *by voter* (rather than by district or precinct) and thus could completely eliminate position effects

Ballot design for individual candidate races

How useful is it for ballots to contain information other than candidate names?

- Party affiliation, whether candidate is an incumbent, occupation, etc. (cues)

Important questions

- Which cues are best, in what order, and who should provide the information (such as occupation)?

Ex: 2002 CA Democratic primary race for Ins. Commissioner. John Garamendi listed occupation as "Businessman/Rancher"; Garamendi was in fact California's first elected Insurance Commissioner and Deputy Secretary of the Interior in Clinton administration