PHIL 308S: Voting Theory and Fair Division

Lecture 1

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September 4, 2012

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Context of Decision Making

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- Individual decision making and individual action against nature.
  - Example: gambling.

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- Individual decision making and individual action against nature.

- Individual decision making in interaction.
  - Example: playing chess.

Context of Decision Making

- Individual decision making and individual action against nature.
- Individual decision making in interaction.
- Collective decision making.
  - Example: carrying a piano, voting

Main Question

Given a group of people faced with some decision, how should a central authority combine the individual opinions so as to best reflect the "will of the group"?

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Typical Examples:

- Electing government officials
- Department meetings
- Deciding where to go to dinner with friends
- ....

Which candidate *should* be chosen?

# voters	3	5	7	6
best	A	A	B	C
↑	B	C	D	B
	C	B	C	D
worst	D	D	A	A

Brams and Fishburn. *Voting Procedures*. Handbook of Social Choice and Welfare (2002).

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A few observations:

- More people rank *A* first than any other candidate

Which candidate *should* be chosen?

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	B	C	D	B
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worst	D	D	**A**	**A**

A few observations:

- More people rank *A* first than any other candidate
- But, a stronger majority ranks *A* last

Which candidate *should* be chosen?

VS.

Marquis de Condorcet (1743 - 1794)

Jean-Charles de Borda (1733 -1799)

Which candidate *should* be chosen?

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	B	C	D	B
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A few observations:

- More people rank A first than any other candidate
- In pairwise elections, C beats every other candidate (C is the Condorcet winner)

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A few observations:

- More people rank A first than any other candidate
- In pairwise elections, C beats every other candidate (C is the Condorcet winner)
- B and C are the only candidates not ranked last by anyone

Which candidate *should* be chosen?

# voters	3	5	7	6
best ↑	A	A	B	C
	B	C	D	B
	C	B	C	D
worst	D	D	A	A

A few observations:

- More people rank A first (last) than any other candidate
- In pairwise elections, C beats every other candidate (C is the Condorcet winner)
- Taking into account the *entire* ordering, B has the most "support" (B is the Borda winner)

Which candidate *should* be chosen?

# voters	3	5	7	6
3	A	A	B	C
2	B	C	D	B
1	C	B	C	D
0	D	D	A	A

A few observations:

- More people rank A first (last) than any other candidate
- In pairwise elections, C beats every other candidate (C is the Condorcet winner)
- B gets 13 (vs. A) + 10 (vs. C) + 21 (vs. D) = 44 points

Which candidate *should* be chosen?

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3	A	A	B	C
2	B	C	D	B
1	C	B	C	D
0	D	D	A	A

A few observations:

- More people rank A first (last) than any other candidate
- In pairwise elections, C beats every other candidate (C is the Condorcet winner)
- B gets 13 (vs. A) + 10 (vs. C) + 21 (vs. D) = 44 points
  C gets 13 (vs. A) + 11 (vs. B) + 14 (vs. D) = 38 points

Which candidate *should* be chosen?

# voters	3	5	7	6
best ↑	A	A	B	C
	B	C	D	B
	C	B	C	D
worst	D	D	A	A

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Conclusion: *many ways to answer the above question!*

Choosing How to Choose

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Plurality, Borda Count, Antiplurality/Veto, and k-approval; Plurality with Runoff; Single Transferable Vote (STV)/Hare; Approval Voting; Condorcet-consistent methods based on the simple majority graph (e.g., Cup Rule/Voting Trees, Copeland, Banks, Slater, Schwartz, and the basic Condorcet rule itself), rules based on the weighted majority graph (e.g., Maximin/Simpson, Kemeny, and Ranked Pairs/Tideman), rules requiring full preference information (e.g., Bucklin, Dodgson, and Young); Majoritarian Judgment; Cumulative Voting; Range Voting

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Choosing How to Choose

Plurality Vote: Each voter selects one candidate (or none if voters can abstain) and the candidate(s) with the most votes win.

Plurality with Runoff: If there is a candidate with an absolute majority then that candidate wins, otherwise the top two candidates move on to round two. The candidate with the most votes in the second round wins.

Choosing How to Choose

Approval Voting: Each voter selects a *subset* of the candidates (empty set means the voter abstains) and the candidate(s) with the most votes win.

Borda Count: Each voter provides a linear ordering of the candidates. The candidate(s) with the most total **points** wins, where points are calculated as follows: if there are n candidates, $n-1$ points are given to the highest ranked candidates, $n-2$ to the second highest, etc..

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Axiomatics: Characterize the different social decision methods in terms of normative principles of group decision making.