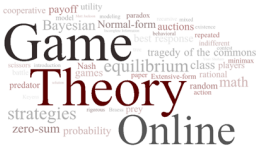
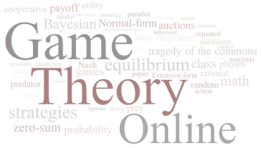


Social Choice: Paradoxical Outcomes

Game Theory Course:
Jackson, Leyton-Brown & Shoham

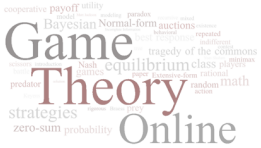
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner?

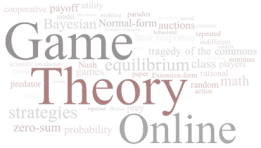
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner? B

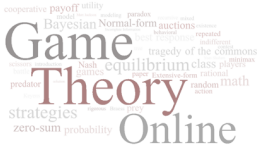
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner? B
- What would win under plurality voting?

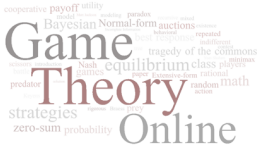
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner? B
- What would win under plurality voting? A

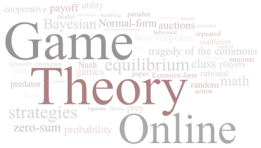
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner? B
- What would win under plurality voting? A
- What would win under plurality with elimination?

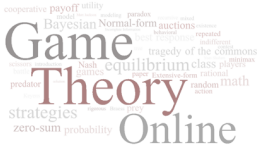
Condorcet example



499 agents:	$A \succ B \succ C$
3 agents:	$B \succ C \succ A$
498 agents:	$C \succ B \succ A$

- What is the Condorcet winner? B
- What would win under plurality voting? A
- What would win under plurality with elimination? C

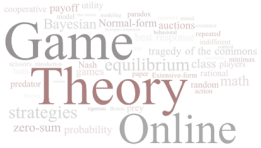
Sensitivity to Losing Candidate



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- What candidate wins under plurality voting?

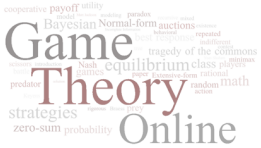
Sensitivity to Losing Candidate



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- What candidate wins under plurality voting? A

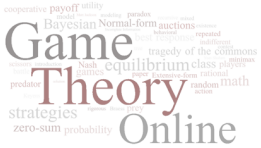
Sensitivity to Losing Candidate



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- What candidate wins under plurality voting? A
- What candidate wins under Borda voting?

Sensitivity to Losing Candidate



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

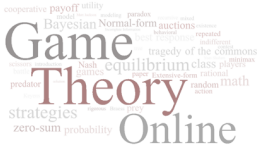
- What candidate wins under plurality voting? A
- What candidate wins under Borda voting? A

Sensitivity to Losing Candidate

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- What candidate wins under plurality voting? A
- What candidate wins under Borda voting? A
- Now consider dropping C. Now what happens under both Borda and plurality?

Sensitivity to Losing Candidate



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

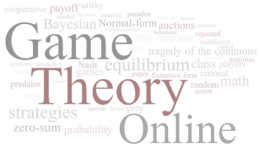
- What candidate wins under plurality voting? A
- What candidate wins under Borda voting? A
- Now consider dropping C. Now what happens under both Borda and plurality? B wins.

Sensitivity to Agenda Setter

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- Who wins pairwise elimination, with the ordering A, B, C?

Sensitivity to Agenda Setter



35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- Who wins pairwise elimination, with the ordering A, B, C? C

Sensitivity to Agenda Setter

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- Who wins pairwise elimination, with the ordering A, B, C? C
- Who wins with the ordering A, C, B?

Sensitivity to Agenda Setter

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- Who wins pairwise elimination, with the ordering A, B, C? C
- Who wins with the ordering A, C, B? B

Sensitivity to Agenda Setter

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

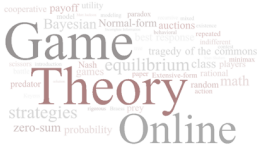
- Who wins pairwise elimination, with the ordering A, B, C? C
- Who wins with the ordering A, C, B? B
- Who wins with the ordering B, C, A?

Sensitivity to Agenda Setter

35 agents: $A \succ C \succ B$
33 agents: $B \succ A \succ C$
32 agents: $C \succ B \succ A$

- Who wins pairwise elimination, with the ordering A, B, C? C
- Who wins with the ordering A, C, B? B
- Who wins with the ordering B, C, A? A

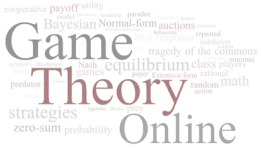
Another Pairwise Elimination Problem



1 agent: $B \succ D \succ C \succ A$
1 agent: $A \succ B \succ D \succ C$
1 agent: $C \succ A \succ B \succ D$

- Who wins under pairwise elimination with the ordering A, B, C, D?

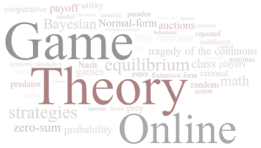
Another Pairwise Elimination Problem



1 agent: $B \succ D \succ C \succ A$
1 agent: $A \succ B \succ D \succ C$
1 agent: $C \succ A \succ B \succ D$

- Who wins under pairwise elimination with the ordering A, B, C, D? D.

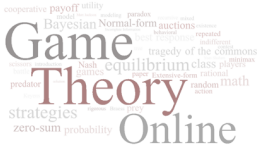
Another Pairwise Elimination Problem



1 agent: $B \succ D \succ C \succ A$
1 agent: $A \succ B \succ D \succ C$
1 agent: $C \succ A \succ B \succ D$

- Who wins under pairwise elimination with the ordering A, B, C, D? D.
- What is the problem with this?

Another Pairwise Elimination Problem



1 agent: $B \succ D \succ C \succ A$
1 agent: $A \succ B \succ D \succ C$
1 agent: $C \succ A \succ B \succ D$

- Who wins under pairwise elimination with the ordering A, B, C, D? D.
- What is the problem with this?
  - *all* of the agents prefer B to D—the selected candidate is Pareto-dominated!