

[illegible]

Social Choice: Paradoxical Outcomes

Game Theory Course:
Jackson, Leyton-Brown & Shoham

[illegible]

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

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

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Game Theory

Bayesian Normal-form auctions

equilibrium class rational math

Online

strategies zero-sum probability

predator Nash equilibria

tragedy of the commons

repeated

cooperative payoff utility

paradox prisoner's dilemma

behavioral adulterous antitrust

paper extensive-form random action

agencies Brock Pindyck

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Game Theory

cooperative payoff utility added common modeling paradoxes repeated rational Bayesian Normal-form auctions science behavioral Nash equilibrium class rational mathematics predator strategies zero-sum probability Online action random Extensive-form paper games tragedy of the commons outcome science

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- ## Social Choice: Paradoxical Outcomes

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 Nash equilibrium class payoff
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 predator rationality
 repeated tragedy of the commons
 random action
 extensive-form rational
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 sufficient
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3 agents: $B \succ C \succ A$

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

Game Theory

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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: $B \succ A \succ C$

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



Sensitivity to Losing Candidate



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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 ?

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

Sensitivity to Agenda Setter



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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 ?

Game Theory

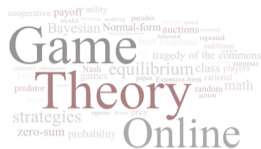
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Another Pairwise Elimination Problem



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

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

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

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

Another Pairwise Elimination Problem

l 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 .



[illegible]

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

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

l 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?

Game Theory

cooperative payoff utility added common modeling paradoxes repeated rational Bayesian Normal-form auctions science behavioral Nash equilibrium class rational mathematics predator strategies zero-sum probability Online action random Extensive-form paper games tactics tragedy of the commons

I 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!