Game Theory Week 3

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What are solution concepts?

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- There is an implicit computational problem of finding these outcomes given a particular game.
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Solution concepts we've seen so far:

- Pareto-optimal outcome
- Pure-strategy Nash equilibrium
- Mixed-strategy Nash equilibrium
- Other Nash variants:
  - weak Nash equilibrium
  - strict Nash equilibrium
- maxmin strategy profile
- minmax strategy profile
- strategy profiles that survive iterated elimination of DS

Lecture Overview

Fun Game!

	L	R
T	$80, 40$	$40, 80$
B	$40, 80$	$80, 40$

- Play once as each player, recording the strategy you follow.

Fun Game!

	L	R
T	$320, 40$	$40, 80$
B	$40, 80$	$80, 40$

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Fun Game!

	L	R
T	$44, 40$	$40, 80$
B	$40, 80$	$80, 40$

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Fun Game!

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T	$80, 40$; $320, 40$; $44, 40$	$40, 80$
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- What does row player do in equilibrium of this game?
  - row player randomizes 50-50 all the time
  - that's what it takes to make column player indifferent
- What happens when people play this game?
  - with payoff of 320, row player goes up essentially all the time
  - with payoff of 44, row player goes down essentially all the time

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- How would you compute a maxmin strategy in a general-sum game?

Computing Maxmin Strategies in General-Sum Games

Let's say we want to compute a maxmin strategy for player 1 in an arbitrary 2-player game G.

- Create a new game G' where player 2's payoffs are just the negatives of player 1's payoffs.
- The maxmin strategy for player 1 in G does not depend on player 2's payoffs
  - Thus, the maxmin strategy for player 1 in G is the same as the maxmin strategy for player 1 in G'
- By the minmax theorem, equilibrium strategies for player 1 in G' are equivalent to a maxmin strategies
- Thus, to find a maxmin strategy for G, find an equilibrium strategy for G'.