Econ 171  Fall 2012

Class 1 - October 1, 2012

- Index cards: Name, pronunciation, perm no., major, native language, Math background, Reason for interest in class, Economics is...
- Web: Gauchospace
- Office hours: Monday, 10:30 - 11:30, NH 3049
- Materials:
  1. *Strategy* by Joel Watson
  2. iClicker
- Waitlist: https://waitlist.ucsb.edu/
What is (and is not) game theory?

Is this a situation to which we would apply game theory?

- Suppose there is a monopolist
  - What is optimal $p, q$? No
  - A competitor is considering entering the market—what is optimal $p, q$? Yes

- You go out to dinner with your friends
  - Everyone pays for own meal. No
  - Split the bill equally. Yes
What is (and is not) game theory?

Definition
Game Theory is a formal way to analyze interaction among a group of rational agents who behave strategically.

Important concepts packed into this definition:

- Group: more than one decision maker
- Interaction: one player’s behavior affect’s another
- Strategic: players take this interdependence into account
- Rational: Players choose the best action (given beliefs)
Q: When does game theory apply?

A: *Strategic Situations*

**Definition**

A *strategic situation* is a situation in which one party’s behavior affect’s another party’s well-being.

Q: What are some more examples?

A: Let’s live some...
Example 1

We each have a quarter. Let’s put them down on the desk at the same time. If they show the same side (HH or TT), you take my quarter. If they show opposite sides (HT or TH), I take yours.

What if we play sequentially?

Theme 1: Strategic uncertainty Players’ interests conflict—given opponent’s action, it’s easy to know what to do, but you don’t know what your opponent will choose (cf. sequential alternative to this game)
Example 2

Rowena and Colin are commercial fishermen on Lake Norma as duopolists. Each chooses independently how intensely to fish the lake. If both are conservative, the fish stock remains healthy and they both make a good profit. If both fish intensely, the stock collapses, yielding only a small catch for both. If one conserves while the other fishes intensely, the stock does not collapse. The intense fisher profits greatly, while the other earns next to nothing.

Theme 2: Individual vs. Group Interest

Prisoners’ or social dilemma)
Example 3

You were going to meet your friend on campus for quick bite, but you didn’t say whether to meet at Romaine’s at the UCen or Woodstocks at the Arbor. Now your friend’s phone died and you can’t reach her. You don’t care where you eat, you just want to see your friend in the brief time before class starts. Where do you go?

Theme 3: Difficulty of Coordination
Example 4

You were going to meet your friend on campus for quick bite, but you didn’t say whether to meet at Romaine’s at the UCen or Woodstocks at the Arbor. Now your friend’s phone died and you can’t reach her. You would rather eat with her anywhere than without her. However, you like Romaine’s twice as much as Woodstocks and you know that she feels exactly the opposite. Where do you go?

**Note:** Environment may be both competitive and cooperative

**Other themes:** Importance of timing and information
Goals and Focus

This course: introduces main topics and tools of game theory, emphasis on practical understanding

- Goal: be able to formalize a strategic situation as a well-defined game

- Goal: choose appropriate solution concept to analyze a wide variety of games and applications

- Goal: understand assumptions underlying these concepts, their strengths and limitations

- Focus: *non-cooperative game theory*—treats all action as individual actions
Structure & Schedule

• Three parts:
  1. Static settings, simultaneous actions
  2. Dynamic settings, sequential actions
  3. Information

• Each part:
  • 1 problem set
  • 1 Exam
What is a game?

Elements of formal representation

- list of players: e.g. \{Player 1, Player 2\}, \( I = \{1, 2, \ldots, n\} \), 
  \{Worker, Boss\}

- action space: a complete description of the possible actions available to each player, e.g. \{Work, Shirk\}, or \( S_1 = \{U, D\} \)
  and \( S_2 = \{L, R\} \)

- a specification of players' preferences over all combinations of actions, usually a utility function

Let's formalize one example
How do we make predictions about behavior?

• Use a *solution concept*—offer criteria for how we should predict or advise people to play.

• We’ll look at them in increasing order of sophistication

• No ’ideal’ solution concept
  • Each has strengths and limitations
  • Simple, general ideas can be too crude
  • More sophisticated concepts difficult to use, apply narrowly
What do we look for in a solution concept?

- Existence
- Uniqueness: creates tension with existence
- Invariant to trivial transformations
- Seems correct intuitively: several criteria for this will be discussed in the course, eg. no dominated strategies, follows backwards, forwards induction.