Course outline:
An informal introduction to Game Theory

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Strategic interactions

Definition

A strategic environment is a situation in which:

1. Different people are to make decisions
2. The payoff of each person potentially depends both on his own choice and on the choice of others

- Strategic environments are different from market environments: in a market, each agent only cares about prices, he doesn't care about other people's choices
- Market theory can be justified when there are many players and all of them are "small"

Strategic environments

Examples

- Economic examples:
  - oligopolistic competition, R& D, supply chain
  - principal-agent problems, teamwork
  - lobbying, auctions, procurement
- Non-economic examples:
  - leisure games
  - war
  - elections, clubs/families, international negotiations
  - judicial procedures
  - natural selection, animal interaction, population dynamics
  - software interaction, artificial intelligence

Game theory and rational behavior

- Game theory tries to understand and predict (human) behavior in strategic situations
- It starts by assuming that people are "rational":

Definition

We say that a person is rational if:

1. He/she always tries to maximize his expected payoff
2. He/she is unboundedly smart in that she can do whatever computations necessary to determine his/her optimal choice

- For most of the course we will take the rationality assumptions for granted
- Close to the end of the course we will argue that these are reasonable assumptions for many situations as long as we carefully define payoffs

Applications of Game Theory

1. Learning to play the game:
   - In the beginning Game Theory was developed to help the US government make better decisions during WW2
   - If a player is able to predict the behavior of his opponents, he can determine what his/her best course of action is

2. Mechanism design:
   - If we can predict how people react to incentives, we can generate the incentives that will induce desired behavior
   - Engineers design airplanes by understanding the laws of Physics, Economist design social mechanisms by understanding Game Theory.
   - Like airplanes, mechanisms are technology that can be used for different purposes: the purpose is determined by the user and not by the technology

Course outline

- Extensive form games
- Strategic form games
- Beliefs, best responses and rationalizability
- Nash equilibrium
- Backward induction and subgame perfection

- Incomplete contracts and moral hazard
- Repeated games and relational contracts
- Games with incomplete information
- Topics in informational economics
- Introduction to rational choice theory