Game Theory
Basic ideas and examples

Why the game theory may be useful for you?

- Because you play games all the time!
  - with your parents
  - with your siblings
  - with your friends and foes
  - with your professors
- Because the others play games with you all the time!
  - sellers, employers, politicians

Game Theory
Basic ideas and examples

Why the game theory may be useful for you?

- Because you will play games!
  - with your children
  - with your spouse
  - with your employer
  - with your employees
- Because games are played!
  - in business
  - in politics
  - during wars

Game Theory
Basic ideas and examples

Games involve:

- chance
- skill
- strategy

Game Theory
Basic ideas and examples

Game theory: the science of rational behavior in interactive situations

Game Theory
Basic ideas and examples

Strategy

Strategic thinking is essentially about your interactions with the others

Game theory is about interactive decision making

Game Theory
Basic ideas and examples

Some examples of the games

- Rock, paper, scissors (mixed strategy)
  http://www.gametheory.net/media/Princess.wmv
- Non-studying cartel (prisoners' dilemma)
- "Flat tire" (backward reasoning, focal point)
- High demands, no concessions (commitments, reputation)
- "War of attrition" (chicken game, brinkmanship)
- The dating game (signaling and screening)
- Dziennik vs. GW (entry and exit games)

Game Theory
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It is high time to play a game

(this time however dogs will play it)

Game Theory
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Case Study approach vs. *Theory*

The player who knows how will usually draw, the player who knows why will usually win

Tom Wiswell – A world champion of checkers

Focus on theory but build it up through cases

Game Theory Terminology

Decisions vs. games

Decision – I decide without concern for your reaction or response

Game – mutual awareness of the cross-effects actions

I know, that you know, that I know that you know……..

Game Theory Terminology

Classifying games

- Sequential vs. Simultaneous (first/second mover advantage)
- Total conflict vs. some commonality (zero-sum games, constant-sum games; usualy non zero sum - war example and Pyrrhic victory (Heraclea 280 B.C. „*Another such victory and we are lost!*”)
- One shot vs. repeated (with the same or changing opponents) (One shot: simpler – no future, but more complicated at the same time – lack of knowledge about the others.)

Game Theory Terminology

Classifying games

- Full vs. equal information (external and strategic uncertainty; games of perfect and imperfect information) (incomplete (asymmetric) information: signals and signaling; screening and screening devices)
- Fixed vs. Manipulable rules of game (game and pregame)
- Enforceable vs nonenforceable agreements to cooperate (cooperative vs noncooperative games)

Game Theory Terminology

Basic concepts and assumptions

- Players
- Moves (actions)
- Strategies (complete plan of action)
- Payoff, also expected payoff (including everything)
- Rationality (complete knowledge, perfect calculator)
- Equilibrium (outcome of the players' best strategies)
- Common knowledge of rules (list of players; strategies available to each; payoffs, assumption about rationality)

Game Theory Terminology

Basic concepts and assumptions

- Dynamics and evolutionary games

- Observation and Experiment

Game Theory Terminology

The use of GT

Explanation (why did it happen?)

Prediction

Advice or prescription

Game Theory Introduction

It is high time to play a game again

21 flags

- sequential, zero-sum,
- 2 players
- 21 flags (coins, bricks)
- Each player can remove 1, 2 or 3 flags
- The player to remove last flag is a winner

Game Theory Introduction

It is high time to play a game again

21 flags

Homework

Find the winning strategy

Game Theory Introduction

It is high time to play a game again

All pay auction