

# Game Theory ISCI 330 Class Notes (2007)

## *Class 1: Jan. 9 Tuesday – Course Intro/Overview*

### Prep

- 1) Bring syllabus as handouts?
- 2) Print out class list with student pictures
- 3) Bring poker chips, prize for overall winner

### Logistics (20 min)

- 1) Intro self, Kevin
- 2) ISCI philosophy behind co-instruction
  - a) get students' ideas – what has worked well, not so well in other courses
  - b) common purpose, but may have different methods, philosophies, opinions
- 3) Go over syllabus—policies, schedule, textbook, other texts (library on reserve), projects, etc.
- 4) Student Introductions
  - a) where you're from
  - b) major and subjects integrated
  - c) favorite non-academic hobby/activity
  - d) anything else we should know?
- 5) Gillian (introduction)
- 6) Verify attendance with students registered, auditors?
- 7) Questions?

### Poll students (15 min)

- 1) GT definition?
- 2) How is it useful? Why is it important? Who uses it?
- 3) ISCI definition?
- 4) How/why does GT fit into ISCI?
- 5) What are you hoping to get out of the class?

### GT the Big Picture (25 min)

- 1) GT as a “Systems Science” (Integrated Science?)
  - a) Diagram of Sci disciplines → Sys Sci → Math and Philosophy (increasing levels of abstraction)
    - i) Disciplines where used: economics, biology, computer science, psychology, political science, sociology – anyone interested in characterizing social interactions that affect utility of agents
  - b) Mario Bunge: “stuff-free science”
    - i) School, flock, crowd example
    - ii) GT players (= agents) (abstract notion: could be bacteria, people, groups, nations, computer programs, etc.)
      - (1) Things that can be said to have interests (utility), but don't have to be conscious of these interests

- (2) In GT we are interested in their cooperative/competitive interactions (not what they actually are)
- c) Mario Bunge: “an exact and scientific metaphysics”
  - i) GT exact -- fully developed mathematical theory
  - ii) GT scientific – (applies to many sci fields: economics, biology, CS, psychology, linguistics)
  - iii) GT metaphysical – applies to the real world, useful in everyday life and interactions; competition and cooperation fundamental aspects of real world
- 2) Nobel Prizes in Economics (for GT work)
  - a) 2005 Robert J. Aumann and Thomas C. Schelling:
    - i) “for having enhanced our understanding of conflict and cooperation through game-theory analysis”
  - b) 1994 John C. Harsanyi, John F. Nash Jr., Reinhard Selten
    - i) “for their pioneering analysis of equilibria in the theory of non-cooperative games”
- 3)  $GT > DT$  or  $DT > GT$ ?
  - a) GT both descriptive and normative – it describes systems but also says what agents “should do” in different circumstances
- 4) Illustrate game matrix as
  - a) GT: neighbor waters lawn and your car y/n; bring umbrella y/n
  - b) DT: it rains y/n; bring umbrella y/n (NO WEATHER FORECAST)
  - c) Modifications
    - i) Ordinal preferences ( $B > S > T > W$ ) vs. real numbers
    - ii) Probability of different decisions by opponent (or nature, i.e. with weather forecast)
  - d)
- 5) Questions

### **Play a game (20 min)**

- 1) Fish PG game, 4 to a group.
    - a) Three times, 2-4 rounds each (but don’t tell them)
      - i) No talking or communicating
      - ii) Give them 45 seconds to talk within groups
      - iii) Allow them to make rules within groups
    - b) Prize for overall winner
    - c) Parting question: what rule maximizes individual gain (utility) if we play many rounds?
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