Economics 208: Games and Information Winter 2013

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Class schedule: MW 12:30-1:50 p.m. in Econ 304. Watson's office hours: after class on Mondays.

This is an advanced course in game theory, intended for second year students who are interested in pursuing micro theory research or who want a good theory background to do applied work. The course will cover a combination of standard results and current research topics. The prerequisites are all of the Ph.D. microeconomics core courses in the department. This course counts towards the Microeconomics field.

There will be three problem sets and a research proposal. Work on your solutions to the problem sets in groups of three or four, and submit your solutions together as a single document. All assignments and exams must be submitted by email as a .pdf document; either use TeX or another language / word processor that can handle mathematics. While you are welcome to discuss the problem set in broad conceptual terms with others outside of your group, we ask that you not share your specific solutions and answers with others outside your group before the submission deadline.

The research proposal is due at the end of the quarter. It should comprise a review of technical papers in the literature, some new idea or question along with motivation, and your attempt at formulating the model. You should meet with one of the instructors to discuss the topic of the research proposal by the end of the second week. We imagine that five to ten pages would be sufficient to exposit an excellent research proposal.

(The outline for Watson's part of the course appears on the next page.)

Watson's part of the course

Dates: 1/7, 1/9, 1/14, 1/16, 1/21 (MLK holiday, maybe rescheduled), 1/23, 1/28, 1/30, 2/4, 2/6.

Topics:

1. Bargaining

Nash (1950)*, Binmore, Rubinstein, and Wolinsky (1986)*.

2. Recursive Formulations (rationalizability and repeated games):

(a) <u>Pearce (1984)</u>*, <u>Bernheim (1984)</u>, <u>Battigalli (1997)</u>, <u>Shimoji and Watson (1998)</u>*, <u>Dekel, Fudenberg, and Morris (2007)</u>

(b) <u>Abreu</u>, <u>Pearce</u>, and <u>Stacchetti (1990)</u>*, <u>Rubinstein (1986)</u>*, <u>Abreu (1986)</u>, <u>Abreu (1988)</u>.

3. Incomplete Information and Reputation:

Kreps and Wilson (1982), Milgrom and Roberts (1982), Fudenberg and Levine (1989), Battigalli and Watson (1997)*, Kreps, Milgrom, Roberts, and Wilson (1982), Watson (1996)*, Fudenberg and Maskin (1986)*, Schmidt (1993), Cripps, Mailath, and Samuelson (2004)*.

4. Relational Contracting and Contractual Equilibrium:

MacLeod and Malcomson (1988), Levin (2003)*, Goldlucke and Kranz (2012)*, Watson (2006)*, Miller and Watson (2012)*.

Watson (1999)*, Halac (2012).

5. Networks and Contracts:

Watson (2012, 2013, to be distributed), Martimort (2012) or other.

Economics 208: Games and Information, Sobel Segment

Description I will give five lectures. I hope to provide a basic overview/review of signaling and then move to a discussion of communication and complexity. The signaling segment (and my preferences) requires that I talk a bit about equilibrium selection. The remaining class will be an idiosyncratic introduction to communication in organizations. I want to discuss ways to think about the idea that communication failure is often due to complexity of the situation rather than differences of opinion.

Schedule of Readings I will hold classes on 2/11, 2/13, 2/20, 2/25, and an additional date (to make up for the 2/18 holiday) on 2/15, 12:30-2, provided that the class and a room is available. Here is a rough outline and suggested readings. I'll provide additional references and, I hope, notes to supplement the lectures.

Lecture 1 Review of signaling games. Overview of cheap talk.

Crawford and Sobel [3] Green and Stokey [8] Sobel [16]

Lecture 2 Equilibrium Selection.

Lecture 3 Communication in Organizations. Arrow [1]

Garicano and Prat [7]

Lecture 4 Organizational Codes. Crémer, Garicano, and Prat [4] Dessein and Santos [5] Dewatripont and Tirole [6]

Lecture 5 Vagueness and Ambiguity. Blume and Board [2] Grice [9] Hertel and Smith [10] Juba, Kalai, Khanna, and Sudan [11] Lewis [12] Lipman [13] Rubinstein [14] Sobel [15]

References

- [1] Kenneth J. Arrow. The Limits of Organization. Norton, New York, NY, 1974.
- [2] Andreas Blume and Oliver J. Board. Language barriers. *Econometrica*, 2013.
- [3] Vincent P. Crawford and Joel Sobel. Strategic information transmission. *Econometrica*, 50(6):1431–1451, November 1982.
- [4] Jacques Cremer, Luis Garicano, and Andrea Prat. Language and the theory of the firm. The Quarterly Journal of Economics, 122(1):373–407, 2007.
- [5] Wouter Dessein and Tano Santos. Adaptive organizations. Journal of Political Economy, 114(5):956– 995, 2006.
- [6] Mathias Dewatripont and Jean Tirole. Modes of Communication. Journal of Political Economy, 113(6):1217–1238, 2005.
- [7] Luis Garicano and Andrea Prat. Organizational economics with cognitive costs. Technical report, London School of Economics, 2011.
- [8] Jerry R. Green and Nancy L. Stokey. A two-person game of information transmission. Journal of Economic Theory, 135(1):90–104, 2007.
- [9] H. Paul Grice. Logic and conversation. In Studies in the Way of Words, chapter 2, pages 22–40. Harvard University Press, Cambridge, 1989.
- [10] Johanna Hertel and John Smith. Not so cheap talk: Costly and discrete communication. Technical report, Rutgers University-Camden, June 2010.
- [11] Brendan Juba, Adam Tauman Kalai, Sanjeev Khanna, and Madhu Sudan. Compression without a common prior: an information-theoretic justification for ambiguity in language. Technical report, Harvard University, 2012.
- [12] David Lewis. Convention: A Philosophical Study. Harvard University Press, Cambridge, 1969.
- [13] Barton L. Lipman. Why is language vague? Technical report, Boston University, December 2009.
- [14] Ariel Rubinstein. *Economics and language*. Cambridge University Press, New York, 2000.
- [15] Joel Sobel. Complexity versus conflict in communication. Proceedings of 46th Annual CISS (Conference on Information Sciences and Systems, 2012.
- [16] Joel Sobel. Giving and receiving advice. In Daron Acemoglu, Manuel Arellano, and Eddie Dekel, editors, Advances in Economics and Econometrics. Cambridge University Press, 2013.

ECON 208: Games and Information WINTER 2013

Instructors:

- Nageeb Ali, email: nageeb+econ208@gmail.com, Office: ECON 214.
- Joel Sobel, email: jsobel@ucsd.edu, Office: ECON 311
- Joel Watson, email: jwatson@ucsd.edu, Office: ECON 310.

Time and Location: MW 12:30pm-1:50pm

Office Hours: By appointment.

Description of the Course

This is an advanced course in game theory, intended for second year students who are interested in pursuing micro theory research or who want a good theory background to do applied work. The course will cover a combination of standard results and current research topics. The prerequisites are Economics 200B and 200C or equivalent.

Pre-requisites and Fields: You must have taken the entire Ph.D. microeconomics core in the department. This course counts towards the Microeconomics field.

Grading: There will be 3 problem sets and a research proposal. For the problem sets, we would like for you to work on your solutions to problem sets in groups of approximately 3 and write up your solutions together as a single document. All assignments and exams have to be turned in by email as a .pdf document: either use TeX or any other language / word processor that can handle mathematics. While you are welcome to discuss the problem set in broad conceptual terms with others outside of your group, we ask that you not share your specific solutions and answers with others outside your group before the submission deadline. You are always welcome to email us or come by our office to discuss the problem set.

At the end of the quarter, we would like a research proposal. The research proposal can comprise a review of a few papers alongside the development of a new idea or question; alternatively, it can include the motivation for a research idea that is then formalized in the proposal as a model. Students should meet with one of the instructors to discuss the topic of the research proposal by the end of the second week. We imagine that 5 - 10 pages is sufficient to exposit an excellent research proposal.

Schedule of Readings

Nageeb Ali: Epistemic Game Theory and Higher-order beliefs.

- 2/27-3/4: Knowledge, beliefs, and behavior: Aumann (1976), Aumann and Brandenburger (1995), Milgrom and Stokey (1982), Geanakoplos and Polemarchakis (1982), Feinberg (2000), Samet (1998a,b).
- 3/6-3/11: Higher-order beliefs: Rubinstein (1989), Brandenburger and Dekel (1993), Carlsson and Van Damme (1993), Morris and Shin (2001), Dekel, Fudenberg, and Morris (2007), Weinstein and Yildiz (2007).
- 3. 3/13: A dynamic robustness / global game paper: one of Angeletos, Hellwig, and Pavan (2007), Penta (2012), or Reputation without Commitment by Weinstein and Yildiz.

References

- ANGELETOS, G., C. HELLWIG, AND A. PAVAN (2007): "Dynamic global games of regime change: Learning, multiplicity, and the timing of attacks," *Econometrica*, 75, 711–756.
- AUMANN, R. (1976): "Agreeing to disagree," The annals of statistics, 4, 1236–1239.
- AUMANN, R. AND A. BRANDENBURGER (1995): "Epistemic conditions for Nash equilibrium," *Econometrica*, 1161–1180.
- BRANDENBURGER, A. AND E. DEKEL (1993): "Hierarchies of beliefs and common knowledge," Journal of Economic Theory, 59, 189–189.
- CARLSSON, H. AND E. VAN DAMME (1993): "Global games and equilibrium selection," *Econometrica*, 989–1018.
- DEKEL, E., D. FUDENBERG, AND S. MORRIS (2007): "Interim correlated rationalizability," *Theoretical Economics*, 2, 15–40.
- FEINBERG, Y. (2000): "Characterizing common priors in the form of posteriors," Journal of Economic Theory, 91, 127–179.
- GEANAKOPLOS, J. AND H. POLEMARCHAKIS (1982): "We can't disagree forever," Journal of Economic Theory, 28, 192–200.
- MILGROM, P. AND N. STOKEY (1982): "Information, trade and common knowledge," Journal of Economic Theory, 26, 17–27.
- MORRIS, S. AND H. SHIN (2001): "Global games: theory and applications," Cowles Foundation Discussion Paper No. 1275R.
- PENTA, A. (2012): "Higher Order Uncertainty and Information: Static and Dynamic Games," *Econometrica*, 80, 631–660.
- RUBINSTEIN, A. (1989): "The Electronic Mail Game: Strategic Behavior Under" Almost Common Knowledge"," *The American Economic Review*, 385–391.
- SAMET, D. (1998a): "Common priors and separation of convex sets," *Games and economic behavior*, 24, 172–174.
- (1998b): "Iterated expectations and common priors," *Games and Economic Behavior*, 24, 131–141.
- WEINSTEIN, J. AND M. YILDIZ (2007): "A structure theorem for rationalizability with application to robust predictions of refinements," *Econometrica*, 75, 365–400.