Organization: The course meets Winter Quarter, from 8:00-9:20 on Tuesdays and Thursdays in Economics 300, with the first meeting on Tuesday, January 6 (don't miss the Epiphany!). My office hours will be Wednesdays from 2:00-3:00 or by appointment. Those who just want to hear the lectures should enroll S/U; there will then be no formal requirements. Those who want a grade should enroll for one; their requirement will be either a research paper on a topic in the general area of the course or a three-hour final exam at a time to be arranged in exam week. The final exam is the default for those enrolled for a grade; those who wish to substitute a paper should discuss the topic and timing with me by the fifth week. The final exam will include a half-hour essay question, which is now posted on the course web page; this question is meant to help you think about how to use behavioral game theory to do economics, and its choices give you some freedom to make it about the kind of economics you are interested in. There is also an optional problem set on the course web page, which should be good practice for the final exam and may help you think about some of the issues we discuss in lectures. If you are a student who plans to attend the lectures, please enroll either S/U or for a grade (this will help the Department convince the administration that graduate electives are worth offering).

Abstract: Behavioral game theory is a blend of theory and empirical regularities whose goal is the kind of understanding of strategic behavior needed to analyze economic, political, and social interactions. This requires understanding the issues addressed by behavioral decision theory, plus some that are specific to multi-person settings: (i) preference interdependence (as in altruism, envy, reciprocity, or spite); and (ii) players’ mental models of other players. Here I narrow the focus to (ii), taking behavior as (mostly) rational in the decision-theoretic sense and self-interested.

Game theory has described players’ mental models of others in two very different ways, which coexist too peacefully in the literature. Traditional (noncooperative) game theory assumes players form correct (self-confirming) beliefs about each other’s decisions, and so, if rational, play a Nash equilibrium immediately. In effect this assumes players have perfect mental models of others (including others’ mental models of them). Adaptive learning models instead study repeated play of analogous games, making assumptions directly about players’ decisions and how they adjust them in response to experience; these assumptions invoke simplified mental models of others. In such models direct observation of others’ decisions in analogous games takes the place of mental models, and (in sufficiently stationary environments) players can learn to play an equilibrium.

The main difference between the two approaches is the assumed sophistication of players’ mental models, or their strategic sophistication. People’s responses to games in the laboratory, and presumably in the field, usually reveal some sophistication, but seldom enough to focus their beliefs as required for equilibrium the first time they play a game. Although they often learn to play an equilibrium, the learning process is usually history-dependent and its outcome can be influenced by players’ initial responses and their learning rules, which are influenced by their sophistication. (For instance, sophistication is the main difference between the behavioral assumptions of the two most often studied classes of learning rules, reinforcement and beliefs-based models.)
One can imagine a theory of sophistication that completely determines it the way traditional game theory seeks to completely determine behavior, but it is unlikely that a useful theory can dispense entirely with empirical knowledge. Behavioral game theory combines theory and empirical (often experimental) evidence to identify the most useful parts of traditional and adaptive theories, representing sophistication and certain other aspects of strategic behavior by stable behavioral parameters, measuring them, and developing the implications of the resulting models.

The course will begin by reviewing the leading theories of players’ initial responses to games (iterated reasoning about rationality or beliefs, backward and forward induction, and equilibrium-selection conventions based on structure, framing, and/or fairness) and using experimental evidence to explore how the factors they consider influence behavior. The course will then discuss theories of adaptive learning, using experimental evidence to explore the structure of learning rules and how learning interacts with initial responses to determine limiting outcomes.

Outline and Readings: The most important readings are marked * and those on reserve as hard copies are marked +. There is no formal text, but there are useful readings in:


I have ordered some copies of Camerer for the bookstore. Earlier versions of most of the material in the book are posted at "Camerer": http://www.hss.caltech.edu/CourseSites/Psy101/psy101.html, but you may have to search for the right parts using the section heads from the published version. I also give links (sometimes from which to search) for other things available online: e.g JSTOR: http://www.jstor.org/jstor/, Kluwer: http://www.kluweronline.com/, and ScienceDirect: http://www.sciencedirect.com/science/journals/economics.

1. General background readings on game theory
   *Camerer, Appendix 1.1 "Basic Game Theory" (pp. 25-34)

2. Overview of behavioral game theory and game experiments
   *Crawford, Sections 1-3 (pp. 206-216 in original) and Section 7 (pp. 235-236)
   *Camerer, Chapter 1, “Introduction,” and Appendix 1.2 "Experimental Design" (pp. 34-42)
   Alvin Roth, Chapter 1, pp. 1-23 in Kagel and Roth
3. Theory and evidence on initial responses to games (spaces separate groups of readings)
a. Iterated dominance and equilibrium in simultaneous-move games
   *+Crawford, Section 4 (pp. 216-220)
   *Camerer, Chapter 5, “Dominance-Solvable Games” (pp. 199-264)
   +Matthew Rabin, "Incorporating Behavioral Assumptions into Game Theory," Chapter 4 (pp. 69-87) in James Friedman (ed.), Problems of Coordination in Economic Activity, Kluwer 1994

   Miguel Costa-Gomes and Vincent Crawford, "Cognition and Behavior in Two-Person Guessing Games: An Experimental Study," (paper, instructions, data, and slides at http://weber.ucsd.edu/~vcrawfor/#Guess)

b. Backward induction, subgame-perfectness, and forward induction in extensive-form games
   *+Crawford, Sections 4.2 (pp. 218-220), 5.1 (pp. 220-221), and 6.3 (p.230)
   *Camerer, Section 4.2 "Structured Bargaining" (pp. 161-182), Chapter 5, “Dominance-Solvable Games” (pp. 199-264), and Section 7.2 "Asymmetric Players: Battle of the Sexes" (pp. 353-367)


c. Selection among multiple strict equilibria via structure, framing, or complexity

*Camerer, Chapter 7 "Coordination" (pp. 336-407)
*+Crawford, Sections 5.1 and 5.2 (pp. 220-223)


Vincent Crawford "Adaptive Dynamics in Coordination Games," *Econometrica* 63 (January 1995), 103-143, Section 2 (pp. 106-109, especially footnote 8) (http://www.jstor.org/jstor/ or http://weber.ucsd.edu/~vcrawfor/PubPapers.html)


d. Selection among multiple strict equilibria via fairness and/or precedent

*+Crawford, Section 5.3 (pp. 223-227)
*+Camerer, Section 4.1 "Unstructured Bargaining" (pp. 153-161)

Schelling, Chapter 3, “Bargaining, Communication, and Limited War,” and Appendix C


+Alvin Roth, "Toward a Focal-Point Theory of Bargaining," Chapter 12 (pp. 259-268) in Roth, (ed.), *Game-Theoretic Models of Bargaining*, Cambridge, 1985


2. Theory and evidence on adaptive learning

a. Overview of adaptive learning models

*+Crawford, Sections 2.3 and 2.4 (pp. 211-214) and Section 6 (pp. 227-235)
*+Camerer, Chapter 3, "Mixed-Strategy Equilibrium Games" (pp. 118-150) and Chapter 6, "Learning" (pp. 265-335 in book; earlier version is not online)


### b. Equilibrium selection via learning

*Crawford, Section 6 (pp. 227-235)

*Camerer, Sections 7.4 "Payoff-Asymmetric Order-Statistic Games" (pp. 375-395) and 7.6 "Applications: Path-Dependence, Market Adoption, and Corporate Culture" (pp. 399-405), 8.1 "Simple Signaling Games and Adaptive Dynamics" (pp. 408-427), and 8.4 "Conclusion" (pp. 462-464)


Vincent Crawford "Adaptive Dynamics in Coordination Games," *Econometrica* 63 (January 1995), 103-143 (http://weber.ucsd.edu/~vcrawfor/PubPapers.html or http://www.jstor.org/jstor/)


c. Rule learning and strategic teaching
*Camerer, Section 6.7 "Rule Learning" (pp. 324-331)


d. Learning from imperfect analogies


David Cooper and John Kagel, "Learning and Transfer in Signaling Games," manuscript, 2002 (not online; pdf sent by request)


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