Graduate Experimental Economics 279

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Office hours: by appointment (but feel free to make an appointment!)
There is no textbook, but a useful book to have is: The *Handbook of Experimental Economics*, John Kagel and Alvin E. Roth, editors, Princeton University Press, 1995.

Some new chapters from the second volume.

Other interesting books are:


There will also be supplementary readings, particularly as the course progresses.
Grading

The major class assignment will be to design an experiment. Students registered for a grade should have a subject area by the middle of the quarter, and should plan to meet with me several times in the second half of the quarter to discuss the development of a detailed experimental design.

I am prepared to entertain designs put together by a pair of students.

Some class time near the end may be devoted to student presentations.
Paper requirement

• Question:
  – statement of research question
  – prediction based in economic theory

• Contribution:
  – explanation of how study contributes to existing literature

• Method:
  – Task the subjects will complete
  – Procedures, treatments, number of subjects per treatment
  – Instructions for subjects (appendix)
  – Directions for experimenters (appendix)

• Analysis:
  – description of how the data will be analyzed to test the prediction or analysis of a trial run
  – Alternative hypotheses/interpretations
How to get the most out of this class

This class consists of three chief parts:
- In class lectures, discussions, and demonstrations.
- Readings and homework’s about them
- Your experimental design (and the out of class discussions with me that will be part of that).

I’m going to try to make the three parts complements rather than substitutes. In class, I’m going to try to give you a feel for design issues that may not be clear from the readings, even from reading the original papers. I’m not going to try to simply review as many experiments as possible in class—that’s what the Handbook chapters are for. Read them, to get a broad overview. The individual papers that will be assigned will help us focus on specific design issues.

As the quarter progresses, you will be better able to start to think about questions on which you might want to do an experiment, and how it might be designed. Let me know when you’re ready to make an appointment to talk about it.

Everyone should make an appointment with me well before the quarter ends!
Topics to be covered in Class

• **Individual Decision Making:**
  – Endowment Effect, Behavioral Preferences
  – Incentives
  – Utility Theory, Prospect Theory

• **Two or Multi Player Games:**
  – Guessing Game
  – Bargaining
  – Coordination Games
  – Public Good Games

• **Markets**
  – Double Auctions
  – Market Design
  – Auctions

• **Gender, Discrimination, Groups**
  – Competition
  – Overconfidence

• **Theories to account for non-standard Behavior**
  – Fairness
  – Learning
  – Quantal Response Equilibrium
  – K-level thinking
Special this year

We have many visitors who will tell us about their newest research:
- Attila Ambrus (Harvard) (Groups versus Individuals)
- Guillaume Frechette (NYU) (Repeated Games, Political Economy)

Expecting
- Marie-Pierre Dargnies (Paris) (Gender)

Guest Lecture:
- Clayton Featherstone (Matching Experiments)
- Thomas Buser (Amsterdam) (Gender)
- Charles Sprenger (UCSD) (Discounting – Hyperbolic?)
Any House-keeping Questions?
Class content

• This course will be an introduction to experimental economics, its methods, and some of the major subject areas that have been addressed by laboratory experiments.

• An effort will be made to concentrate on series of experiments, in order to see how experiments build on one another and allow researchers with different theoretical dispositions to narrow the range of potential disagreement.
Why concentrate on series of experiments?

Because we learn a lot more from a series of experiments than from the individual experiments:

"Another way of dealing with [experimental research] errors is to have friends who are willing to spend the time necessary to carry out a critical examination of the experimental design beforehand and the results after the experiments have been completed. An even better way is to have an enemy. An enemy is willing to devote a vast amount of time and brain power to ferreting out errors both large and small, and this without any compensation. The trouble is that really capable enemies are scarce; most of them are only ordinary. Another trouble with enemies is that they sometimes develop into friends and lose a good deal of their zeal. It was in this way that the writer lost his three best enemies." (von Bekesy, 1960, pp8-9)

While the history of experimental economics can be traced back much further, only since the 1980’s have we begun to see many series of experiments, in which groups of experimenters with different theoretical predispositions looked at the same phenomena in the laboratory.
Are there any limitations to what parts of economics might benefit from controlled experimentation in the laboratory?

- I can’t think of any…:)

- Obviously, laboratory experiments will most directly address questions in microeconomics. But that doesn’t mean that experimental evidence won’t help us better understand even the largest scale macro phenomena.

- Think of the analogy with biology, which has a comparable range, from molecular biology to medicine to the evolution of species. You can’t bring the fossil record into the lab, but our understanding of it and what it says about evolution is vastly increased by experiments on fruit flies, plant breeding, etc.
experimental economics

1. Use of Experiments
2. What makes a good experiment?
3. Designing an experiment
   1. Identifying question and treatments
   2. Pointers: Clean Beaker, Anonymity, Deception, Repetition etc.
4. Running the experiment
5. Instructions
6. Reporting Results.
1. Use of Experiments

A. Test a theory
   – “Speaking to theorists”: testing theories under precisely controlled and/or measured conditions that are typically unavailable in field data.
   – The development of game theory gave particular impetus to experimental economics in the 1950’s, as game theory offered testable theories of economic behavior that depended on the fine structure of both the strategic environment and the preferences of the players.
1. Use of Experiments

B. “Searching for facts”

– looking for regularities, and exploring and documenting unanticipated regularities (including those that come from violations of the predictions of existing theories)

– E.g., empirical observations:

  • How do people play games? Do they play Nash? What is the attraction of efficient outcomes? If there are multiple equilibria which is selected?

  • Few women in senior management why? Do they respond differently to the competitive pressure?
1. Use of Experiments

C. Gather empirical regularities to inform a theory

- “Searching for Meaning”: formulating new theories, to explain newly observed regularities, and devising new experiments to help distinguish among such theories

- Examples:
  - experimental findings that showed evidence of behavior that was not payoff maximizing led to series of tests on other-regarding preferences and development of alternative theory
  - deviation from expected utility theory led to a number of studies which gave rise to generalized expected utility theory
  - How do people play games: Learning theories, k-level thinking…
1. Use of Experiments

D. Test institutions

– “Whispering in the ears of princes”: policy oriented experiments

– market design:
  • How should you conduct a spectrum auction?
  • How should you set up a school choice mechanism?
  • How should you design a dating market?
  • How should you conduct your fundraising campaign?
  • How should we conduct the econ job market?
2. What makes a good experiment?

- Should an experiment replicate reality?
- Should an experiment replicate a formal model?
- Answer to both: Often no
- Goal:
  - a design that offers the best opportunity to learn something useful and to answer the questions that motivate your research
  - an experiment is judged by it’s impact on our understanding
2. What makes a good experiment?

• Answer depends on what you are testing or exploring, and who you are talking to
• But… a good design
  • is simple compared to reality and simpler than relevant models
  • designed to test specific hypotheses
  • tests or controls for alternative hypotheses (what those are may depend whom you talk to, which is why psychology experiments often look different).
2. What makes a good experiment?

• A good design controls for the most plausible alternative hypotheses that might explain what is being observed:
  – Protect *ourselves* from fooling ourselves into believing what we want to believe
  – Science done by people who are following up on their intuitions, and (often) investigate hypotheses that they believe to be true
  – The same intuition that causes you to believe the hypothesis might give you a good idea of situations in which the hypothesis will hold
  – **But** if there are other reasons that those conclusions might hold, you have to make sure that you haven’t just created a situation that gives you the results you expect, but not for the reason that you believe.
2. What makes a good experiment?

• What are the most plausible alternative hypotheses we should be controlling for?
  – depends on who you are talking to (economists/psychologists?)
  – creature of its time may depend on recent developments in theory, in the laboratory (yours or someone else’s), or in the field
  – some alternative hypotheses become obsolete with time – because they are rejected
2. What makes a good experiment?

Testing alternatives

• Design by subtraction:
  – If you think X is the reason for the result, design an experiment in which X is impossible, but all other explanations are possible. This can isolate the effect you want.

• Design by manipulation:
  – Change a parameter that you think should make X a more likely explanation, or make it easier for X to be expressed in the game.
  – Caution: never clear that the manipulation is working on the mechanism you hypothesize
2. What makes a good experiment?

• Direct experimental control: Control vs. Treatment
  – Test hypothesis by changing one variable at a time
  – Only change variables which are directly relevant to the hypothesis being tested, otherwise holding the environment fixed
  – Avoid confounds (don’t change more than one thing at a time.)

• Indirect experimental control: Uncontrolled factors? controlled via randomization
  – E.g., experiments designed to test how subjects’ attitudes towards fairness are affected by some treatment variable. Subjects enter the lab with differing attitudes about fairness => a true controlled experiment can’t be run.
  – By randomly assigning subjects to treatments, we can eliminate subjects differing attitudes as a cause of differences between treatments. This relies on the law of large numbers, implying that a large sample may be necessary.
  – Or, you can measure variables which you think may affect fairness directly: Gender, age, major..
2. What makes a good experiment?

• Indirect experimental control: within subject design
  – Within-versus between-subject design (panel vs. cross section)
  – Within-subject: participants make decisions in all treatments
  – Between-subject: different participants make decisions in each treatment
  – Advantage vs. disadvantage of within-subject design:
    • Advantage: each subject is its own control. Need not worry about having different characteristics of participants in each treatment (often easier to get significance)
    • Disadvantage: order effect / fatigue
2. What makes a good experiment?

• Design Choices
  – One round versus many rounds?
  – Pay one round or all rounds?
  – Use language that is neutral?
  – Train participants, or test them before you use them as participants in your experiment?
  – …
2. What makes a good experiment?

- Design Choices: Lab or Field Experiment?
  - Advantage of Field:
    - More sexy (as if self-selected participants of some dinkly market are more “real” than undergraduates)
    - Subject pool is the subject of interest: Use politicians to study legislative bargaining, use eBay users to study design changes on eBay.
    - Sometimes you want really large samples (hundreds or thousands of people): Lab may be much more expensive.
    - Sometimes you want to test if a change would have a sizeable effect when many other things happen as well. (The lab is not so great to estimate parameters, the lab may be more useful to study treatment effects)
2. What makes a good experiment?

• Design Choices: Lab or Field Experiment?
  
  • Advantages of the Lab:
    
    – **More control**: typically it is easier to get strict instructions followed when experiments are run in the lab.
      
      » Students may follow difficult instructions more easily.
    
      » Our small incentives are often more meaningful.
    
    – **More transparency**: The subject pool (undergraduates) is well understood. In the field you may worry you use a subject pool prone to some bias, that is then attributed to the experiment.
    
    – **More replicable**: Lab experiments are very easy (and cheap) to replicate. This may make us more comfortable with surprising results (Remember: We want to protect ourselves from fooling ourselves!).
    
    – **Market Design**: One can’t easily ‘experiment’ in half the market, not feasible or not ethical. The lab allows us to generate many markets.
3. Designing an experiment

• Good experiment:
  – Identify an interesting question or questions (issues that are better addressed through a controlled experiment than through gathering field data)
  – Determine precise hypotheses
  – Design a simple environment that allows you to test the hypotheses you are interested in
    • The more complicated the environment the more likely you are to lose control and be unable to draw inference
    • Think of alternative hypothesis (don’t fool yourself or others)
A great (very early) experiment

Dew it both ways” Judges Chapter 6 (by way of Al Roth)

And Gideon said to God: 'If You will save Israel by my hand, as You have said, look, I will put a fleece of wool on the threshing-floor; if there be dew on the fleece only, and it be dry upon all the ground, then shall I know that You will save Israel by my hand, as You have said.'

And it was so; for he rose up early on the next day, and pressed the fleece together, and wrung dew out of the fleece, a bowlful of water.

And Gideon said to God: 'Do not be angry with me, and I will speak just this once: let me try just once more, I ask You, with the fleece; let it now be dry only upon the fleece, and upon all the ground let there be dew.'

And God did so that night; for it was dry upon the fleece only, and there was dew on all the ground.
3. Designing an Experiment: Pointers

• Keep a clean beaker
  – Chemists used to use metal beakers for mixing ingredients, until they learned that the metal sometimes reacts with the chemicals. Then they switched to glass.
  – Make sure you limit the things that can react with your treatment. You want to be able to replicate environment
    • Precise description of experimental protocol
    • Easy to understand instructions
    • In general: No talking (participants, experimenters), No distractions
    • I prefer to answer questions in private (why would anyone give, why don’t we all cooperate)
    • Smaller groups reduce the risk that one participant says something out loud and affects the whole group.
3. Designing an Experiment: Pointers

• Deception:
  – Avoid the use of deception. However, it is “allowed” to not reveal the whole truth
  – A very tempting trap – concern is not the effect on the initial study rather one of public good provision: what is going to happen the next time you try to run an experiment?
  – Close to impossible to publish economic research with even minor deception
3. Designing an Experiment: Pointers

• Anonymity:
  – Single blind versus double blind
  – Single blind: Subjects guaranteed that no other subjects (or indeed, nobody other than the researchers) will be able to ever identify their actions or payoffs.
  – Double blind: Subjects guaranteed that no one can link their decisions to their identity. Example: dictator game, walk into a booth, two envelopes, ten dollar bills and ten slips of paper similar size, place ten units in each envelope, take one envelope with them, place another in a box and leave.
  – Abandoning anonymity: if abandoning anonymity is an important part of the design then subjects should know what information about them is to be revealed publicly, and have the option of withdrawing if they do not want information about them revealed publicly (this is in general required by Internal Review Boards that review your experiment).
4. Running the Experiment

• Secure IRB approval
  – Pass the training
  – Request IRB approval

• Planning:
  – Complete script of procedures
  – What is said when? Think everything out in advance and practice
  – Test software multiple times
  – Have friends read instructions, do the experiment
  – Run pilots in advance!
4. Running the Experiment

• Preparing:
  – Copies of everything ready (Consent Forms, Instructions, Payoff Tables, Record Sheets, Receipts)
  – Setting up the room
    • cleaning screens
    • marking desks you want used
    • Make it as hard as possible for them to see the materials being filled out by other subjects
    • placing IRB consent forms
  – Testing software
4. Running the Experiment

• Arrival
  – Check people in by ID
  – Separate people who arrive at the same time? Often you may not want subjects talking during the experiment, and people who arrive together are often friends.
  – Sorting: may want to ask participants to wait outside lab
  – Too many subjects: pay extras to leave (easier with two experimenters)
  – Too few: sorry..
4. Running the Experiment

- Seat participants
- Welcome them
  - Explain the consent form to them: may leave at any time etc
  - Ask them to read and sign the consent
  - Collect consent forms
- Instructions (Generally)
  - Hand out instructions
  - Read instructions aloud (public information)
  - Questions? Answered in private and only clarifying questions
  - "We don't know what you should do. The whole purpose of running the experiments is to see what you will do. You should do whatever seems best to you."
4. Running the experiment

• Practice
  – Quiz?
    • Until all answers correct
    • Collect provide answers
  – Trial run

• Start the decision making phase

• Surveys

• Get paid in private one at a time – or given private envelope

• Subjects sign receipts for payment

• Avoid commenting on the purpose of the study
5. Instructions

• **Ad clear as possible:** If subjects do not understand the rules, you have immediately lost control.

• Instructions should be as clear and complete as possible. Any critical points should be repeated at least once. If in doubt, make the instructions too detailed. Nobody likes sitting through lengthy instructions, but remember your goal – the subjects need to understand the rules of the experiment.

• The lab is like an airplane: Turn off cellphones, out them in the bag, no headphones...
6. Reporting Results

• Often, when thinking about which experiments to run, experimenters select a task or experimental conditions through search or other means. The manner in which this selection is carried out, however, is a reportable part of the experiment.

• We may draw different inferences about the robustness of results that result form a search.

• As such we have to think (as referees) about the incentives we provide to different reporting practices. This means, for example, showing tolerance for ambiguity in results in well designed experiments, and also to value replications of experiments, particularly those that aim at investigating the robustness of conclusions.

• This is why we are more interested in series of experiments
Econometrica Guidelines for Experiments

Suggested information to provide for the review process:

1. The subject pool and recruiting procedures.
2. The experimental technology – when and where the experiments were conducted; by computer or manually; online, and so forth.
3. Any procedures to test for comprehension before running the experiment, including the use of practice trials and quizzes.
4. Matching procedures, especially for game theory experiments.
5. Subject payments, including whether artificial currency was used, the exchange rate, show-up fees, average earnings, lotteries and/or grades.
6. The number of subjects used in each session and, where relevant, their experience.
7. Timing, such as how long a typical session lasted, and how much of that time was instructional.
8. Any use of deception and/or any instructional inaccuracies.
Possible class with some interesting guest speakers

Law 462:
Interdisciplinary Research Seminar on Negotiation and Decision Making
Autumn Quarter 2009
Tuesdays and Thursdays 4:15-5:45 P.M. (3 Units)
Location: Law School classroom building, Room 283
Professor Jared Curhan
Email: curhan@stanford.edu
Phone: 650 724 4666

Other possible interesting classes:
Brian Knutson: Neuroeconomics
Social psychology classes (they design great experiments)