WHY EXPERIMENT? An introduction to its purposes, history, and practices (Lecture 1)

[My name, your names, your relevant background – Decision theory? Game theory? Micro theory? Experimental?]

Remark: The lecture notes are exactly that. They are my notes (mistakes and all) for the lecture. Nothing more. They are NOT a transcript of the lecture. (Rather they are my notes for the lecture but they will be, typically, revised after the lecture.)

Lecture notes will be posted after the lecture – normally on the same day - at http://home.cerge-ei.cz/ortmann/TrentoCourse/TrentoCourse.html
There you also find the reading assignments (both required and optional), most of them with a direct link.

---------------------------------------------------------------

[Discussion of syllabus:
- Will revisit some of the assigned readings, sometimes repeatedly.
- You are expected to have read all required readings reasonably well.
- You are not expected to print out all readings. (In fact, you are discouraged from doing so.)
- I consider pop quizzes and calling on people (incentive compatible) fair game
- No presentations (as last year); instead will do occasionally group work based on sets of guiding questions.
- We will often answer such sets of guiding questions in the plenum.
- There will be worksheets (typically online on the evening of the Thursday lecture) that ought to give you some indications how well I expect you to know the assigned readings.
- The goal is to get you to the frontier of experimental economics research.]
Historically, ...


Thurstone (1931) – testing experimentally the indifference curve representation of preferences (famously critiqued by Friedman & Wallis, 1942, for artificiality of experimental situation -> we’ll return to this issue later) ... Allais Paradox and Ellsberg Paradox (Allais 1953; see also Kreps 1990) as examples of individual decision making under risk and uncertainty. ... theories of disappointment and regret as modifications of such theories ... See Starmer (2000) for an excellent discussion of the relevant experimental literature. (Discussed in Prof Mittone’s course?)

Chamberlain (1948; see also Smith 1962), Sauermann & Selten (1959, 1960), Siegel & Fouraker (1960) – testing experimentally the organization of markets and other IO issues ... Plott (see Ortmann 2003) extended the use of experimental methods to
- public economics, political processes, and policy applications
- market institutions and the price discovery processes
- information, finance and general equilibrium

Dresher & Flood (in 1950) – testing experimentally game theoretic hypotheses (such as the Hangman’s Paradox, or PDG, a metaphor of arms races, public good provision, commons problems, price wars and so on – see Ortmann, JEE 2003, and literally thousands of other articles on it; see Roth’s Introduction to Kagel & Roth, 1995, pp. 9/10, for Nash’s critique of these experiments.) ... Nash bargaining solutions ... See Roth (1988) for an excellent discussion of the relevant experimental literature. See also Schelling (1957, 1960). Some of the current issues to be discussed in this course.

Growth data:
- fewer than 10 (30, 50) publications per year before 1965 (1975, 1985)
- more than 100 (200) publications since 1990 (1999)
- Economic Science Association since 1986
- Davis & Holt (1993), Hey (1994), Kagel & Roth (1995), Camerer (2003), ...
- Hertwig & Ortmann (200?)
- Experimental Economics since 1998, since 2005 indexed, soon to have IF

Today ... there is hardly an economics topic on which economists have not experimented ...
See Davis & Holt (1993) - path-breaking book on experimental economics, still very readable. They claim as major insights EE has provided:

1. In many situations, neoclassical price theory explains observed behavior quite well.
2. Institutions matter.
3. Some predictions of game theory describe behavior well.
4. Other game-theoretic predictions have a more restricted range of application.
5. Even apart from the institutional specification, many results are characterized by a “gray” area where variables irrelevant to the theory affect outcomes.
6. Our understanding of individual behavior is incomplete; some recurrent anomalies are fundamental challenges to rational models of behavior.

[Davis and Holt, 1993, 506-509]

See Kagel & Roth (1995)

  A masterful critical review asking all the right questions
- Ochs, Coordination Problems
- Roth, Bargaining Experiments
- Holt, Industrial Organization: A Survey of Laboratory Research
- Sunder, Experimental Asset Markets: A Survey
- Kagel, Auctions: A Survey of Experimental Research
- Camerer, Individual Decision Making
  Idiosyncratic, with a bias towards the heuristics-and-biases school

See Camerer (2003; see review by Ortmann & Rydval, JoEP 2004)

- Dictator, Ultimatum, and Trust Games
- Mixed Strategy Equilibria
- Bargaining
- Dominance-solvable Games (beauty-contests etc.)
- Learning
- Coordination
- Signaling and Reputation
- Top Ten Open Research Questions
  - How do people value the payoffs of others?
  - How do people learn?
  - How do social preferences vary across cultures?
  - What happens when people confront new games?
  - How exactly are people thinking in games?
  - What game do people think they are playing?
  - Can experiments sharpen the design of new institutions?
  - How do teams, groups, and firms play games?
  - How do people behave in very complex games?
  - How do socio-cognitive dimensions influence behavior in games?

See the current issues of journals ...

See what working papers come out these days ...

- Almost everyone has become a behavioralist economist (and dabbles in neuro-science)
- Rational-choice theory gets attacked left and right (mostly by people whose knowledge of modern theory is ... wanting)
... the exciting developments in this field will be discussed in this course ...
also, how experimental economics is different from behavioral economics/finance/etc.
and experimental psychology ...

Most interesting developments (from my point of view) ...

- Renewed reflection on design and implementation issues including the attempt
to “leave the reservation” (Harrison), i.e., doing field experiments
- The attempts of some to complement experiments with humans with those
featuring computational agents
- The empire striking back (e.g., recent work by Cherry et al., Goeree & Holt,
Harrison, List, Plott, Roth, etc.) – this very similar to the critique of the
heuristics-and-biases school by people like Gigerenzer, Lopes, Krueger &
Funder et al.

So, what are the uses of experimentation (today)?
(again, following Roth’s excellent Introduction to Kagel & Roth, 1995, pp. 3 – 109;
see also Ortmann, JoEP 2003, on Plott’s work.)

- “Speaking to Theorists“ -> Lecture 2
  (“theory-first“ approach to experimental research, as Plott calls it)
  - to test the predictions of well-articulated formal theories
  - to observe unpredicted „regularities“ that might lead to new theory
formulations (see also Smith 1991)

- “Searching for Facts“ -> Lecture 2
  (“data-first“ approach to experimental research, as Plott calls it.)
  - to study the effects of variables about which existing theory is moot
  (that might include subtle institutional differences and differences in
design and implementation of experiments; says Camerer, „The way in
which an experiment is conducted is unbelievably important.“ (2003, p.
34))
  - to understand causalities rather than correlations both
  in experimentation but also in theory

- “Whispering in the Ears of Princes“ („design economics“, as Roth has it, and
before him Plott) -> Lecture 3
  - to answer questions raised by regulatory or other state agencies about
the effect of changes in the way some market, or other economics
activity is organized (see Klemperer 2002, Milgrom 2004, Roth 2002,
and the recent flurry of literature on auctions and matching; see also
earlier studies on airport landing slots, space station pricing policies,
emissions trading mechanisms)
  - to study counterfactual designs at low costs (e.g., tests of particular
auction formats or matching schemes)

- Getting right what (some) experimental psychologists get wrong. See assigned
readings by Binmore, Plott, Grether & Plott, and Cherry et al. (and many others to
follow)
### Binmore, Why experiment in economics?
(Why not just leave the experimental testing to experimental psychologists?)

- because the „school of Kahneman and Tversky“ (also known as the heuristics-and-biases school) „has been criticised in the experimental psychology literature for the failure of their results to withstand simple robustness tests (Gigerenzer 1996). … Under the circumstances in which the school of Kahneman and Tversky run experiments, we should not expect economic theory predicting well.“ [F16]

- [people are not omniscient human beings; „people get to equilibrium – insofar as they do – by an interactive process of trial-and-error learning. Taking this view requires accepting that they will not get to equilibrium at all if we put them in too complicated a situation, or fail to make paying attention to what is going on worth their while. … economic theory should only be expected to predict in the laboratory if the following three criteria are satisfied:
  - The problem the subjects face is not only „reasonably“ simple in itself; but is framed so that it seems simple to the subjects;
  - The incentives provided are „adequate“;
  - The time allowed for trial-and-error adjustment is sufficient.
… Just as we need to use clean test tubes in chemistry experiments, so we need to get the laboratory conditions right when we test economic theory.“ [F17]

Do these criteria exclude field experiments? We’ll address this issue later in detail. But note that Binmore speaks about the possibility of experiments being „a source of inspiration for revising the theory where it does not work so well“ [F17].

Can one always verify economic theory by interpreting the criteria „severely enough“?
Can one always falsify economic theory by interpreting the criteria „loosely enough“?
Two case studies:

- two-person, zero-sum games
design and implementation problems? „The only interesting question is whether people learn to play minimax in repeated trials against changing opponents.“ [F19]
See also recent studies with real-world data (e.g.,
- Walker, Wooders (AER 2001), Minimax Play at Wimbledon.
- Palacios-Huerta (RES 2003), Professionals Play Minimax.
- Palacios-Huerta, Volij (Manuscript 2006), Natural Minimax Players

By and far, these data articles/papers suggest that people are pretty good at playing mixed strategies. (Not at trivial result given much evidence to the contrary in psychology.)

- the ultimatum game
design and implementation problems? „[I]t would be a good idea to use both experimental and theoretical tools to find out when and why backward induction predicts successfully and when and why it does not. ... We need a theory that successfully tracks the learning behavior of individuals.“ [F21] Fat chance that! But see ... Johnson, Camerer, Sen, & Rymon (JET 2002), „Detecting Failures of Backward Induction: Monitoring Information Search in Sequential Bargaining.“ (To be discussed later in this class.)

So why do people fail to backward induct in the ultimatum game? (Binmore’s explanation may be found on pages F22/23. Or in his social contract books (1994, 1998, 2006), or Rubinstein’s response-time study (2006); the latter to be discussed later in the course.)
Plott, Economics in 2090: The views of an Experimentalist. (See also Plott’s (SEJ 1991), Will Economics Become an Experimental Science?)

"The assumption is that within the next few decades the biases that now exist in the scientific research establishment will be removed and that the science of economics will be allowed to develop naturally along with the others." (88)

According to Plott progress to be made in

- microeconomic theory ("remains a challenge")
- political science
- organization science
- law
- repeated games, games of asymmetric information
  ("will require another several man-decades of experimental efforts (89)"

What about 2090?

Basic research:
- concerned with preference formation and change (including chemical, biochemical, and physiological influences)
- concerned with how people decide to decide (including problems of cognition)
- ... will be more specialized

Policy analysis:
- will be influenced by theory developments in mechanism design, public choice, social choice (e.g., Bolton & Dewatripont’s Contract Theory; see also Prendergast (JEL 1999))
- concerned with incentive compatibility
- ... will be "substantially complemented by the application of laboratory experimental techniques." (93)

Economics in the classroom
- "will be completely different. ... Students will learn about economic principles from their own experiences and not only from the experiences of other people as reported in books or pages of statistics. ... In spite of what will be known about individual choice behavior, the process of market convergence will still contain many mysteries in 2090." (93)

Holt (2007) seems to indicate that that might happen much earlier than 2090.
Smith distinguishes three views of economics:

1. the rationalist view of (presumably) neo-classical theoretical economists
2. the behavioralist view of (presumably) psychologists (from the Kahneman & Tversky school) that supply falsifying evidence
3. experimental economists that consider economic theory a good approximation for predicting the behavior of duly motivated subjects in laboratory markets but an incomplete theory nonetheless, especially as regards learning and the role of decision costs in it.

"... the rationalist versus the behavioralist views of economics. One would have hoped that in this conference, given the potential of economists and psychologists to learn from each other, the record would have shown more tangible evidence of learning." (877)

"Experimental economics ... reflects equally the rational and behavioral intellectual traditions." (877)

The key issue that Smith pursues is whether there is indeed „a growing body of evidence – mainly of an experimental nature – that has documented systematic departures from the dictates of rational economic behavior“ (Hogarth & Reeder 1987, vii, as cited in Smith, 878.)

Smith argues that rationality is seen in both camps as „conscious cognition“; the two camps agree in two implicit presumptions, and a correlate that follows from them.

- aggregate rationality results from individual rationality
- individual rationality is a cognitively costly process of optimizing in a self-interested manner

=> individual rationality can be tested directly, „isolated from interactive experience in social and economic institutions“ (878). [In one of his forthcoming books, Smith distinguishes very much in the same vein „constructivist“ and „ecological“ rationality; see also his Nobel Prize acceptance speech.]

"What has emerged from 30 years of experimental research is that presumptions 1 – 3 are wrong." (880)

Smith illustrates his case with results like the [private information] ones discussed in Plott (1986); see also later work by Gode and Sunder on ZI-traders (e.g., JPE 1983, „Allocative efficiency of markets with zero intelligence traders: Markets as a partial substitute for individual rationality“.) Specifically, Smith argues against the logic of Kahneman & Tversky that „the axioms of rational choice are generally satisfied in transparent situations and often violated in nontransparent situations.“ (Kahneman & Tversky 1987, 88, as cited by Smith, 881.) Smith argues that it is often the other way around when it comes to the functioning of markets.
Smith then discusses three topics with which he illustrates his point:
- preference reversal and the effects of markets (Chu & Chu, AER 1990, Cox & Grether, ET 1996, the latter to be discussed later in class.)
- Iowa political stock market (and the Presidential race Bush – Dukakis)
  - predicted better than opinion polls
  - showed that verbal utterances may not be connected to actual behavior
- Laboratory stock markets
  - common information environments more stable than private information environments?

Smith also takes issue with „the little‘ evidence that monetary rewards matter“ (887-8). We’ll return to this issue later.

### Cherry, Frykblom, & Shogren, Hardnose the Dictator

Here is what we learn from Camerer (2003, section 2.1.) about the typical result of „dictator games“ , or – maybe better – „reward allocation problems“. These are essentially ultimatum games where the responder does not have a chance to accept or reject. Hence, strictly speaking, it’s not a game.

„The fact that dictator offers are much lower than Proposer offers in ultimatum games, but positive, shows that Proposers are being both strategic (avoiding more to avoid rejection) and altruistic.“ (56)

Hoffman et al. (1994, 1996) showed that giving is, among other things, significantly affected by the „social distance“ between participants and experimenter.

Cherry et al. explore how „asset legitimacy“ (or, earned wealth, i.e., not „manna from heaven“ as is typical in experiments) interacts with social distance in reward allocation experiments.

Subjects were students at UCF.
Three treatments, each with more than 50 bargaining pairs that were randomly allocated to their „roles“ and rooms A and B (without being able to interact before, during, or after the experimental session).

Two stages: earning money and bargaining.

Money was earned by answering 17 GMAT questions under a time constraint.
  - Those who answered at least 10 questions correctly, were paid $40.
  - Those who answered less than 10 questions correctly, were paid $10.

Subjects were then separated into rooms A1 (high earners) and A2 (low earners).

Subjects in room A1 and A2 then decided upon the split of their earned wealth, i.e., their giving to an anonymous and randomly selected counterpart in room B.
Experimental earnings were paid according to the split.

The three treatments were baseline, earnings, and double blind with earnings. In all treatments there were those endowed with $10 and $40 dollars.

Baseline (B): „X has been provisionally allocated to each pair and the person in room A can propose how much of this each person is to receive.“

Earnings (E): „the person in room A has earned an amount of money by participating in a previous session“ and „the person in room B has not had the opportunity to earn any money.“ Also, „the person in room A decides how much of his or her earnings they are to receive and how much of his or her earnings the person in room B is to receive.“

Earnings under double-blind anonymity (DBE): Same as E but with bargaining segment under HMS protocol.

Results? Well, what do you expect?

See Figures 1 and 2:
“other-regarding behavior is greatly diminished when bargaining involves earned wealth.”

- less than 20 percent (L: 19, H: 15) made zero offer in B session
- more than 70 percent (L: 79, H: 70) made zero offer in E session
- more than 90 percent (L: 95, H: 97) made zero offer in DBE session

All treatment effects are significant (Fisher exact test, Wilcoxon) except for the L treatment comparison of E and DBE.

Note the effect of financial incentives; it is not in all cases what economic theory predicts.

Conclusions:

1. Lack of asset legitimacy seems source of giving behavior in dictator games; how about other games (e.g., the alleged altruistic behavior in public good games, gift exchange games, etc.)?

2. To revisit Camer’s claim: Is it altruism or strategic behavior that we see in Dictator, Ultimatum, and Trust games? This evidence seems to suggest it’s strategic behavior. (Demand effects?)

How important is this result?

Does this result matter? (It’s only one of many after all!)

And what might have caused that result? (See more specific work sheet questions)

### Grether & Plott, Economic Theory and the Preference Reversal Phenomenon

What’s the PR phenomenon?

A preference over two lotteries measured in terms of “most preferred” option may be reversed when subjects are asked to place a monetary value on the two lotteries.

Typically, (assuming that the two lotteries have about the same expected value – but compare Table 2 on p. 629:}
- lottery A, the „p-bet“, has a (very) high probability of winning the high outcome
- lottery B, the „$-bet“, has a (very) low probability of winning the (much) high (er) outcome

This behavior violates preference theory (proof: see p. 623).

„If preference theory is subject to systematic exception in these simple cases, how many cases exist? What type of theory of choice can serve as a basis for market theory and simultaneously account for these data? Could such an alternative theory also serve as a basis for welfare economics? Should special extensions of the theory of market choice to other situations such as ... [crime][extramarital affairs] [suicide][politics] ... be called into question? ... There is little doubt that psychologists have uncovered a systematic and interesting aspect of human choice behavior. The key question, of course, is whether this behavior should be of interest to economists. ...

1) Does the phenomenon exist in situations where economic theory is generally applied?
2) Can the phenomenon be explained by applying standard economic theory or some immediate variant thereof? ...

This study was designed to answer these two questions ... we will conclude that the answer to first questions is „yes“ and the answer to the second appears to be „no“.“ (p. 624)

**Important note:**
When reading an experimental paper, it is always a good idea to read the instructions before you get to the meat of the paper (design, implementation, results, discussion, conclusion, possibly even introduction!)

### Table 2—Experiment 1: Pairs of Gambles Used in the Experiments

<table>
<thead>
<tr>
<th>Pairs</th>
<th>Type</th>
<th>Probability of Winning</th>
<th>Amount if Win</th>
<th>Amount if Lose</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P</td>
<td>35/36</td>
<td>$4.00</td>
<td>- $1.00</td>
<td>3.86</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>11/36</td>
<td>$16.00</td>
<td>- $1.50</td>
<td>3.85</td>
</tr>
<tr>
<td>2</td>
<td>P</td>
<td>29/36</td>
<td>$2.00</td>
<td>- $1.00</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>7/36</td>
<td>$9.00</td>
<td>- $5.00</td>
<td>1.35</td>
</tr>
<tr>
<td>3</td>
<td>P</td>
<td>34/36</td>
<td>$3.00</td>
<td>- $2.00</td>
<td>2.72</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>18/36</td>
<td>$6.50</td>
<td>- $1.00</td>
<td>2.73</td>
</tr>
<tr>
<td>4</td>
<td>P</td>
<td>32/36</td>
<td>$4.00</td>
<td>- $5.00</td>
<td>3.50</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>4/36</td>
<td>$40.00</td>
<td>- $1.00</td>
<td>3.56</td>
</tr>
<tr>
<td>5</td>
<td>P</td>
<td>34/36</td>
<td>$2.50</td>
<td>- $5.00</td>
<td>2.33</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>14/36</td>
<td>$8.50</td>
<td>- $1.50</td>
<td>2.39</td>
</tr>
<tr>
<td>6</td>
<td>P</td>
<td>33/36</td>
<td>$2.00</td>
<td>- $2.00</td>
<td>1.67</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>18/36</td>
<td>$5.00</td>
<td>- $1.50</td>
<td>1.75</td>
</tr>
</tbody>
</table>
En route:

**Table 1—Coexisting Experimental Results: Relevance and Possible Explanations**

<table>
<thead>
<tr>
<th>Theoretical Criticism and/or Explanation</th>
<th>Lichtenstein &amp; Slovic (1971) Experiment 1</th>
<th>Lichtenstein &amp; Slovic (1973)</th>
<th>Lindman (1971) Experiment 1</th>
<th>Slovic (1975) Experiment 1</th>
<th>This Study Experiment 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Misspecified Incentives</td>
<td>I I N</td>
<td>N</td>
<td>I I N I</td>
<td>N N</td>
<td>N N</td>
</tr>
<tr>
<td>2. Income Effects</td>
<td>N N E</td>
<td>?</td>
<td>N N E N</td>
<td>N N</td>
<td>N N</td>
</tr>
<tr>
<td>3. Indifference</td>
<td>N I I</td>
<td>I</td>
<td>I I I I</td>
<td>N N</td>
<td>N N</td>
</tr>
<tr>
<td>Psychological</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Strategic Responses</td>
<td>E E E</td>
<td>E</td>
<td>E</td>
<td>N N N N N N</td>
<td>E N</td>
</tr>
<tr>
<td>5. Probabilities</td>
<td>I I N</td>
<td>?</td>
<td>N</td>
<td>N N N N N N</td>
<td>N N</td>
</tr>
<tr>
<td>6. Elimination by Aspect</td>
<td>N N N</td>
<td>N</td>
<td>N</td>
<td>N N N N N N</td>
<td>N N</td>
</tr>
<tr>
<td>7. Lexicographic Semantics</td>
<td>N N N</td>
<td>N</td>
<td>N</td>
<td>N N N N N N</td>
<td>N N</td>
</tr>
<tr>
<td>Experimental Methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Confusion and Misunderstanding</td>
<td>N N N</td>
<td>N</td>
<td>N</td>
<td>N N N N N N</td>
<td>N N</td>
</tr>
<tr>
<td>11. Frequency Low</td>
<td>N N N</td>
<td>N</td>
<td>N</td>
<td>N N N N N N</td>
<td>N N</td>
</tr>
<tr>
<td>13. Experimentists Were Psychologists</td>
<td>I I I</td>
<td>I</td>
<td>I I I I</td>
<td>N N</td>
<td>N N</td>
</tr>
</tbody>
</table>

I = The experiment is irrelevant to economics because of the reason or theory.
N = The experimental results cannot be explained by this reason or theory.
E = The experimental results are consistent with the reason or theory.
? = Data insufficient.

Misspecified incentives are addressed in Grether & Plott through two treatments, „no monetary incentives“ (actually, flat pay) and „monetary incentives“ (see Table 3, p. 630, and also discussion in text on the same page). The two different incentives also allow to assess Decision Costs.

Likewise all other theoretical criticisms and/or explanations are addressed through features of the design of their study. (Questions regarding this in the worksheet for the lecture).

The results?

Table 5, 6 for „no monetary incentives“ and „monetary incentives“ treatments, in Experiment 1. See also Table 7.

Experiment 2 to be discussed next time.
**Table 3—Experiment 1**

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts</td>
<td>No Monetary Incentives</td>
</tr>
<tr>
<td>1</td>
<td>Preferences for Pairs (1), (2), (3)</td>
</tr>
<tr>
<td>2</td>
<td>Selling Prices, All Twelve Gambles</td>
</tr>
<tr>
<td>3</td>
<td>Preferences for Pairs (4), (5), (6)</td>
</tr>
</tbody>
</table>

**Table 5—Frequencies of Reversals, Experiment 1 (No Incentives)**

<table>
<thead>
<tr>
<th>Bet</th>
<th>Choices</th>
<th>Consistent</th>
<th>Inconsistent</th>
<th>Equal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$P$</td>
<td>127</td>
<td>49</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>$S$</td>
<td>130</td>
<td>111</td>
<td>14</td>
</tr>
<tr>
<td>Indifferent</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before Giving</td>
<td>$P$</td>
<td>73</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>Prices</td>
<td>$S$</td>
<td>56</td>
<td>48</td>
<td>5</td>
</tr>
<tr>
<td>After Giving</td>
<td>$P$</td>
<td>54</td>
<td>19</td>
<td>32</td>
</tr>
<tr>
<td>Prices</td>
<td>$S$</td>
<td>74</td>
<td>63</td>
<td>9</td>
</tr>
<tr>
<td>$n = 44$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6—Frequencies of Reversals, Experiment 1 (With Incentives)**

<table>
<thead>
<tr>
<th>Bet</th>
<th>Choices</th>
<th>Consistent</th>
<th>Inconsistent</th>
<th>Equal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$P$</td>
<td>99</td>
<td>26</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>$S$</td>
<td>174</td>
<td>145</td>
<td>22</td>
</tr>
<tr>
<td>Indifferent</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before Giving</td>
<td>$P$</td>
<td>49</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>Prices</td>
<td>$S$</td>
<td>87</td>
<td>70</td>
<td>12</td>
</tr>
<tr>
<td>After Giving</td>
<td>$P$</td>
<td>50</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>Prices</td>
<td>$S$</td>
<td>87</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td>$n = 46$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 7—Experiment 1: Mean Values of Reversals (In Dollars)**

<table>
<thead>
<tr>
<th>Bet</th>
<th>Predicted Incentives</th>
<th>Predicted No Incentives</th>
<th>Unpredicted Incentives</th>
<th>Unpredicted No Incentives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.71</td>
<td>2.49</td>
<td>.40</td>
<td>.79</td>
</tr>
<tr>
<td>2</td>
<td>1.45</td>
<td>2.64</td>
<td>.51</td>
<td>.90</td>
</tr>
<tr>
<td>3</td>
<td>1.48</td>
<td>1.29</td>
<td>1.00</td>
<td>.25</td>
</tr>
<tr>
<td>4</td>
<td>3.31</td>
<td>5.59</td>
<td>3.00</td>
<td>1.83</td>
</tr>
<tr>
<td>5</td>
<td>1.52</td>
<td>1.79</td>
<td>.38</td>
<td>1.29</td>
</tr>
<tr>
<td>6</td>
<td>.92</td>
<td>1.18</td>
<td>.33</td>
<td>.31</td>
</tr>
</tbody>
</table>
What do Grether & Plott conclude?

„As reflected in our concluding remarks, we remain as perplexed as the reader who has just been introduced to the problem.“ (p. 624)

„The only theory which we cannot reject, 9, is in many ways the least satisfactory of those considered since it allows individual choice to depend upon the context in which the choices are made. ... If the questions give 'cues' which trigger a mode of thinking, such cues do not linger. The reversals occur regardless of the order in which the questions are made.

And ... (p. 634)

The fact that preference theory and related theories of optimization are subject to exception does not mean that they should be discarded. No alternative theory currently available appears to be capable of covering the same extremely broad range of phenomena. In a sense the exception is an important discovery, as it stands as an answer to those who would charge that preference theory is circular and/or without empirical content. It also stands as a challenge to theorists who may attempt to modify the theory to account for this exception without simultaneously making the theory vacuous.

### Plott, Rational Choice in Experimental Markets

Preferences are „induced“ monetarily for abstract commodities that exist only for the purpose of the experiment.

Axioms

1. (Salience and nonsatiation) More reward medium (typically, money) is preferred to less, ceteris paribus.

2. (Neutrality) Individuals place no independent value on outcomes other than that provided by the reward medium.

3. (Payoff dominance) Individuals optimize.

Historical note: Smith (1976, 1982) lists five precepts (Non-satiation, saliency, dominance, privacy, parallelism)

Let X be some abstract good, and x denote units of the good.
Ri(x) specifies the reward that participant i will receive from the experimenter should he acquire x units of the good. Participant i’s profit is then the difference between these rewards and the price at which the units of the good were acquired.

Cj(x) is the cost that the participant i has to pay to the experimenter should he sell x units. Participant j’s profit is then the difference between the price at which the units of the goods were sold and the cost that the experimenter collects.

Note that Ri(x) and Cj(x) are completely under the control of the experimenter, in contrast to the price that will emerge in the laboratory market.

Note also that „a theory of rationality is basic to experimental procedures and to the interpretation of the results. If the rationality is not behaviorally reliable, then one would expect economic models to be poor predictors of experimental market behavior because the basic parameters of the economic models would not be controllable.“ (S304)

The first (and also the third) axiom are about incentive effects. To be discussed later. The second axiom „substantially differentiates those who study markets from those that study individuals.“ (S304)

Plott presents three examples of laboratory markets [to be discussed in next class].
- Middlemen (Plott & Uhl 1981) *** Read this particular carefully for next class
- Auctions (Coppinger, Smith, & Titus 1980)
- Signaling (Miller & Plott 1985) *** Read this particular carefully for next class

Ex-post rationalization? Reparameterization? [also to be discussed next class]