

Experimental Economics

- **Introduction**

- What's experimental economics?
- A very brief history
- Example of how to conduct experiments:
Coherent Arbitrariness
 - The experimental method
 - Procedural and design issues
 - How to conduct an experiment
- Overview of the course

What is experimental economics?

- **A discipline in which data are collected in a controlled environment.**



A Brief History

- **Market experiments**

- Decentralized markets
 - Chamberlin (1948) induced demand and cost structure
- Double auction
 - Vernon Smith (1962, 1964)



- **Game experiments**

- Prisoners' dilemma 1950's
 - Originally by psychologists and sociologists
- Oligopoly games
 - Reinhard Selten (1959)



- **Individual choice experiments**

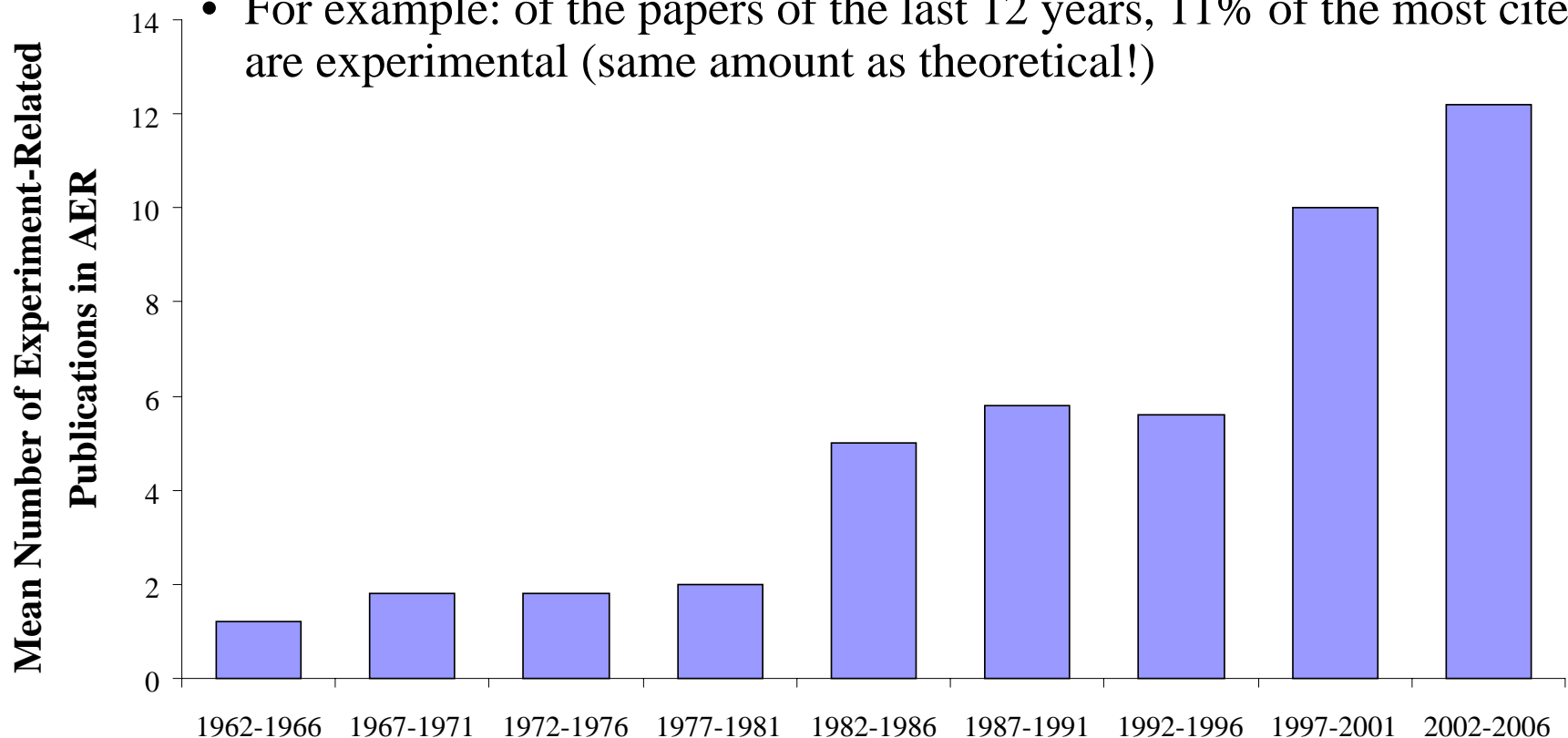
- Choice under uncertainty
 - Savage (1954)
- Allais paradox (1953)



What is experimental economics?

- Economics is becoming an experimental science like physics and biology.
- Like theory, running experiments is an established method to explain and/or describe economic activity.

- For example: of the papers of the last 12 years, 11% of the most cited are experimental (same amount as theoretical!)



The experimental method

- **Advantages of the experiments**
 - **Control**
 - Institutions (e.g. voting rules, communication, etc.)
 - Not always complete control (e.g. social norms)
 - Incentives (payoffs)
 - Not always complete control (e.g. altruism)
 - Measure confounding variables (e.g. beliefs)
 - Randomization (avoids some self-selection problems)
 - **Replication**
 - Check for robustness, experimenter effects, etc.
 - Gives an incentive to do it right
 - Make available: data, instructions, program, and procedures

How to conduct and experiment (example)

- **Preferences**
 - De Gustibus Non Est Disputandum
- **How do people evaluate the value of a good?**
 - Are preferences stable or are they affected by irrelevant information?
 - Do we have preferences over goods we have not consumed?
 - Are preferences completely random?

A simple experiment

- **Lets listen to some music**
 - Composer: Federico Reuben
 - Website: www.myspace.com/freuben
 - Performer: Klang Ensemble



Ordinary goods

- **Valuing ordinary goods** Ariely et al. 2003
- **Experiment:** collection of sessions to evaluate research question
 - Are preferences stable or are they affected by irrelevant information?
 - Are preferences completely random?
- **Design:** description of tasks performed by subjects (combination of treatments and sessions)
 - Ask subjects if they want to buy the good for a price equal to a random anchor
 - Random Anchor: last 2 digits of their SSN
 - Give monetary value to 4 goods (market value around \$70)
 - Two sets of similar goods of differing qualities
 - Elicit their willingness to pay for the good with the Becker-DeGroot-Marschak mechanism

Ordinary goods

- **Valuing ordinary goods** Ariely et al. 2003

- **Treatment variable:** Environment/parameters of interest varied by the experimenter
 - High, middle, and low anchors
 - *Between-subjects variations:* different subjects get different parameters
 - Avoids ‘contamination’ between treatments
 - Must trust the randomization procedure
 - Different qualities of similar goods
 - *Within subjects variations:* same subjects get different parameters
 - Controls for individual characteristics
 - Allows the use of more powerful statistical analysis
 - Must control for sequence effects (e.g. due to learning)
 - Does not work for some treatment variations (e.g. different frames)

- **Session:** Group of subjects doing the experiment at the same time
 - One session with 55 students

Ordinary goods

Last digits of SSN	Cordless trackball	Cordless keyboard	Average Wine	Rare wine
01 – 20	\$8.64	\$16.09	\$8.64	\$11.73
41 – 60	\$13.45	\$29.27	\$12.55	\$18.09
81 – 100	\$26.18	\$55.64	\$27.91	\$37.55

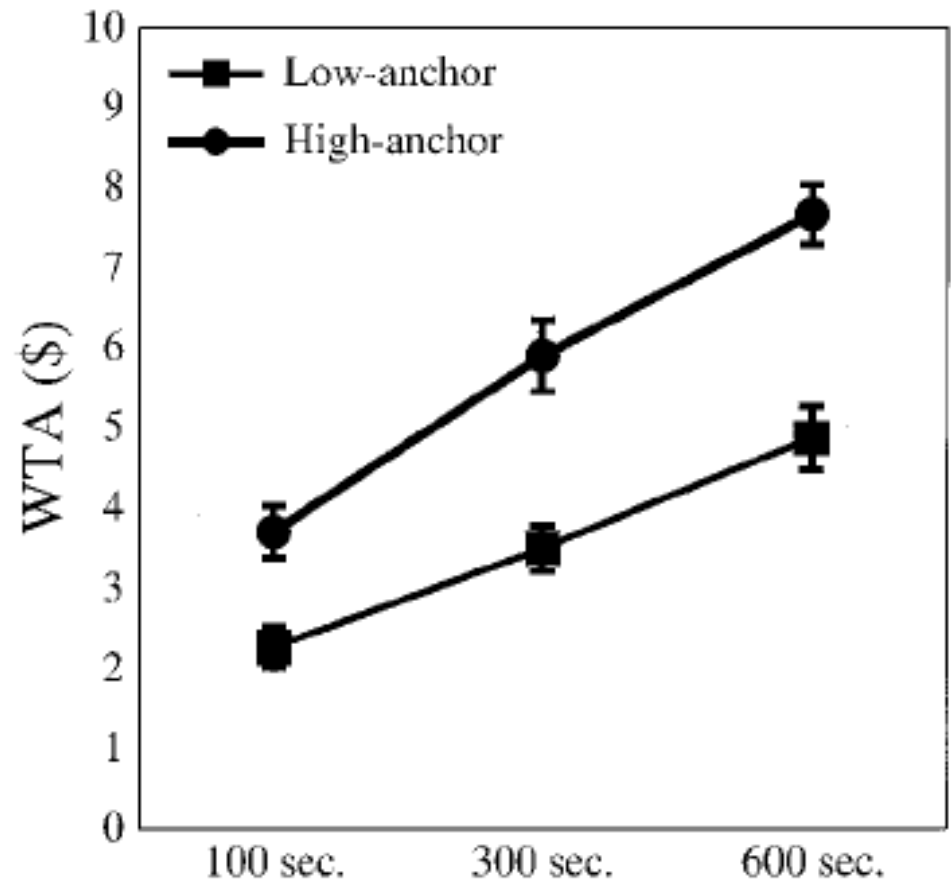
- **Arbitrariness**
 - Subjects with high SSNs pay more
- **Coherence**
 - Subjects pay more for ‘better’ goods
 - Cordless trackball < Cordless keyboard
 - Average wine < Rare wine

Novel goods

- **Valuing novel goods (bads)** Ariely et al. 2003
- **Question**
 - How do we form preferences of goods we have not consumed?
 - Is there a stable valuation of hedonic experiences?
- **Design:**
 - Subjects listen to annoying sounds for 30 seconds
 - Hypothetical question asking whether they are willing to listen to the sound for 300 seconds for a payment equal to the anchor
 - Anchor: first 3 digits of their SSN
 - Elicit their willingness to accept x seconds of the sound with the Becker-DeGroot-Marschak mechanism
 - Ascending: $x = 100, 300, 600$
 - Descending: $x = 600, 300, 100$
- **Treatment variables**
 - Within-subjects treatment variables
 - High, middle, and low values of x
 - Between-subjects treatment variables
 - Ascending or descending sequences of x
 - High and low anchors
- **Session:** One session with 90 students

Novel goods

- **Arbitrariness**
 - Subjects' willingness to accept is lower low anchor (below the median)
- **Coherence**
 - Willingness to accept increases with duration
- **Sequence also has an effect, WTA for 100 sec (600 sec) is higher in the increasing (decreasing) sequence.**

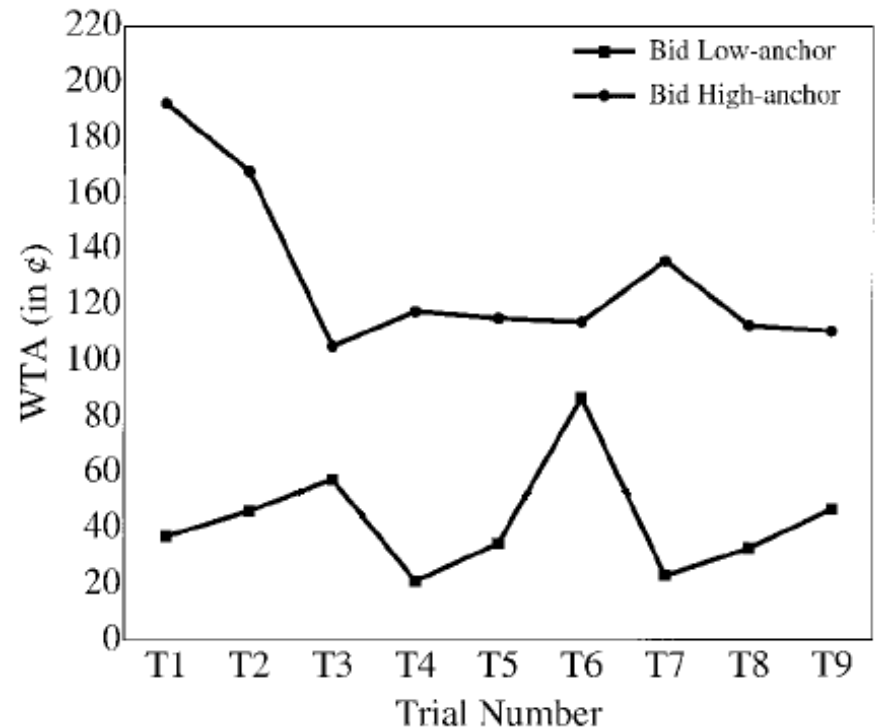


Novel goods

- **Coherent arbitrariness in the market** Ariely et al. 2003
- **Question**
 - Do market forces reduce the initial arbitrariness?
- **Design:**
 - Subjects listen to annoying sounds for 30 seconds
 - Hypothetical question asking whether they are willing to listen to the sound again for a payment equal to the anchor.
 - Anchor: \$1.00 or \$0.10
 - Bid for payment for listening to the sound for x seconds in groups of 6 to 8 subjects. Sealed bid, fourth-price auction with 3 winners.
 - Ascending: $x = 10, 30, 60, 10, 30, 60, 10, 30, 60$
 - Descending: $x = 60, 30, 10, 60, 30, 10, 60, 30, 10$
- **Treatment variables**
 - Within-subjects treatment variables
 - Varying values of x
 - Between-subjects treatment variables
 - Ascending or descending sequences of x
 - High and low anchor
- **Session:** One session with 53 students

Novel goods

- **Persistent Arbitrariness**
 - Subjects' bids are lower for the low anchor
 - No convergence of bids between markets
 - Some convergence of bids within markets



Novel goods

- **Distinguishing pleasure from pain** Ariely et al. 2003
- **Question**
 - Is there even a stable distinction between positive and negative hedonic experiences?
- **Design:**
 - Subjects listen to 1 min poetry reading
 - Hypothetical question 1: Ask willingness to go a 15 min poetry reading if they are paid/have to pay the anchor \pm \$0.50 (last digit of SSN)
 - Hypothetical question 2: Ask willingness to go a 15 min poetry reading if it costs \$ x
 - x from $-\$10$ to $\$10$
- **Treatment variables**
 - Within-subjects treatment variables
 - Varying values of x
 - Between-subjects treatment variables
 - Pay or be paid for consumption frame
 - High and low anchors
- **Session:** One session with 81 students

Novel goods

Frame	attend for \$ SSN	attend for free
Receive payment	63%	9%
Pay	20%	49%

Coherent arbitrariness

- **Summary**

- Valuations are highly sensitive to arbitrary anchor values
 - For all goods?
- After an initial valuation, choices are coherent (mimicking stable preferences)
- Initial choices exert a large effect on subsequent choices
 - What about social interaction?

Back to experimental design

- **More jargon**

- Matching procedures: way of grouping subjects in repeated games
 - *Partners*: always play with same group
 - *Strangers*: randomly re-matched before playing each game
 - *Perfect strangers*: subjects do not play with the same subjects more than once
- Other
 - *Double-blind procedure*: It is obvious that the experimenter cannot figure out who did what (usually not even in the same room)
 - *Incentive compatible*: Monetary incentives are aligned with the variable of interest (it doesn't pay to lie)
 - *Independent observation*: no interaction between data points

How to conduct an experiment

- **Formulate a research question**
- **Choose design to address the research question**
 - Treatment variable(s)
 - Within vs. between
 - Required number of independent observations
 - Number of sessions
- **Prepare experiment**
 - Write instructions for each treatment
 - Write a 'script'
 - Questionnaire
 - Computerized or not
 - Get money to pay subjects

How to conduct an experiment

- **Get IRB authorization (in US)**
- **Run pilot experiment**
 - Improve the design/instructions
- **Run the experiment**
 - Recruit subjects
 - Run the experiment
- **Analyze data**
- **Write paper**

The experimental method

- **Goals for an experiment**

- Theory testing/selection

- **Example: Allais Paradox**

- Choice 1:

- A: \$4000 with $p = 0.20$ or B: \$3000 with $p = 0.25$

- Choice 2:

- C: \$4000 with $p = 0.80$ or D: \$3000 with *certainty*

- EUT predicts people choose A-C or B-D

A-C or B-D = 52%

A-D or B-C = 48%

The experimental method

- **Goals for an experiment**

- Stress testing

- **Example:**

- Contributions to a public good are around 30% above the Nash prediction in many experiments using groups of 4 subjects.
- Stress test: Do contributions converge to the equilibrium if group size increases?

Groups of: 10 = 30% above,
40 = 40% above, 100 = 40% above

The experimental method

- **Goals for an experiment**
 - Search for empirical regularities
- **Example:**
 - We often observe that subjects do not use backward induction.
 - Collect data to find regularities that might help us to develop a theory.

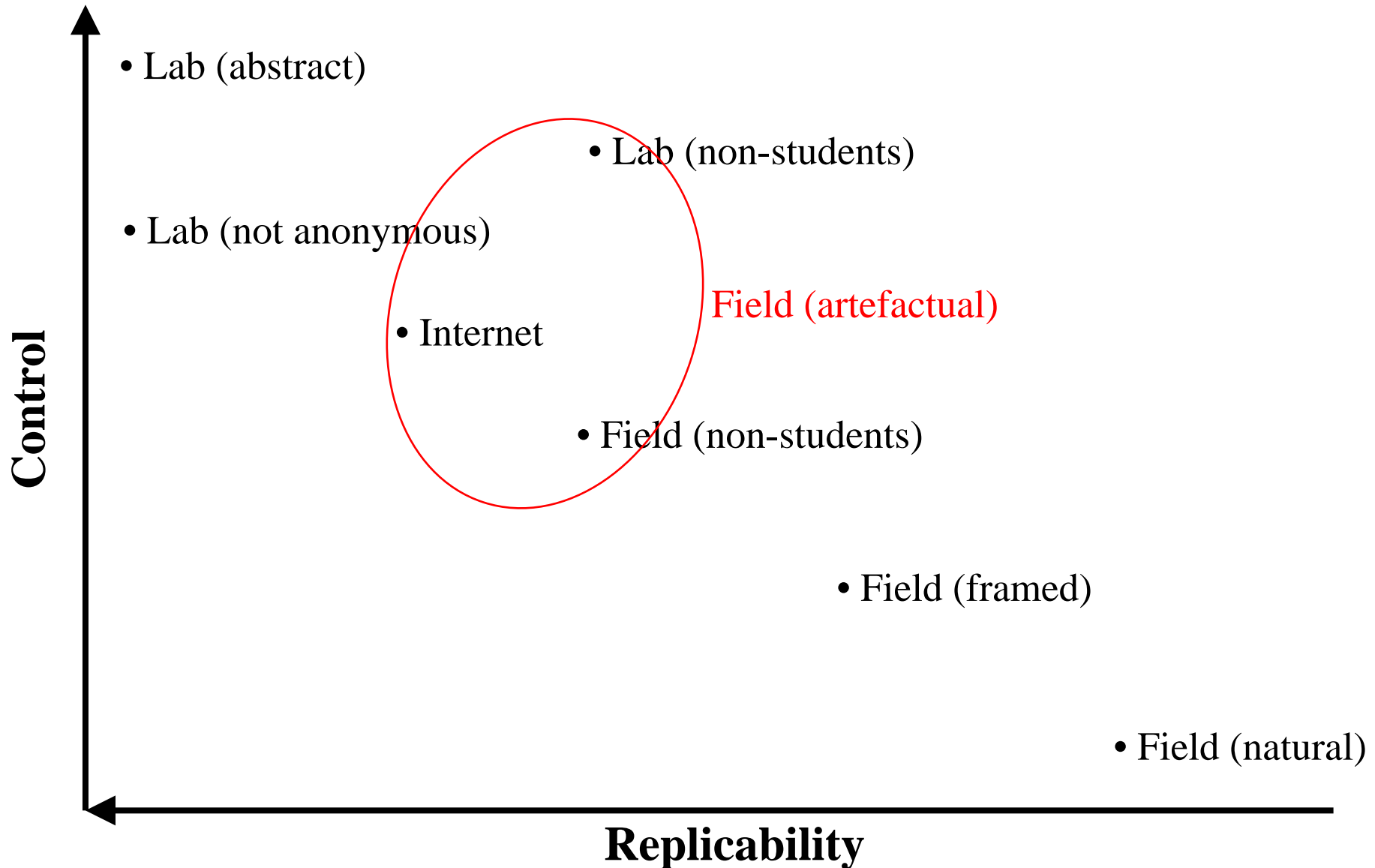
The experimental method

- **Goals for an experiment**
 - Advise policy makers
- **Examples:**
 - Test performance of different auctions in order to sell spectrum rights.
 - Test ways to regulate a privatized electricity market.
 - Test the effects on worker motivation of various compensation schemes.

The experimental method

- **Some Objections**
 - Lack realism
 - Real subjects making real money ...
 - Less relevant for testing theories
 - Realism can be added in controlled steps
 - Representativeness of subjects
 - Less important for comparative statics
 - Can be tested (not important in many situations!)

The experimental method

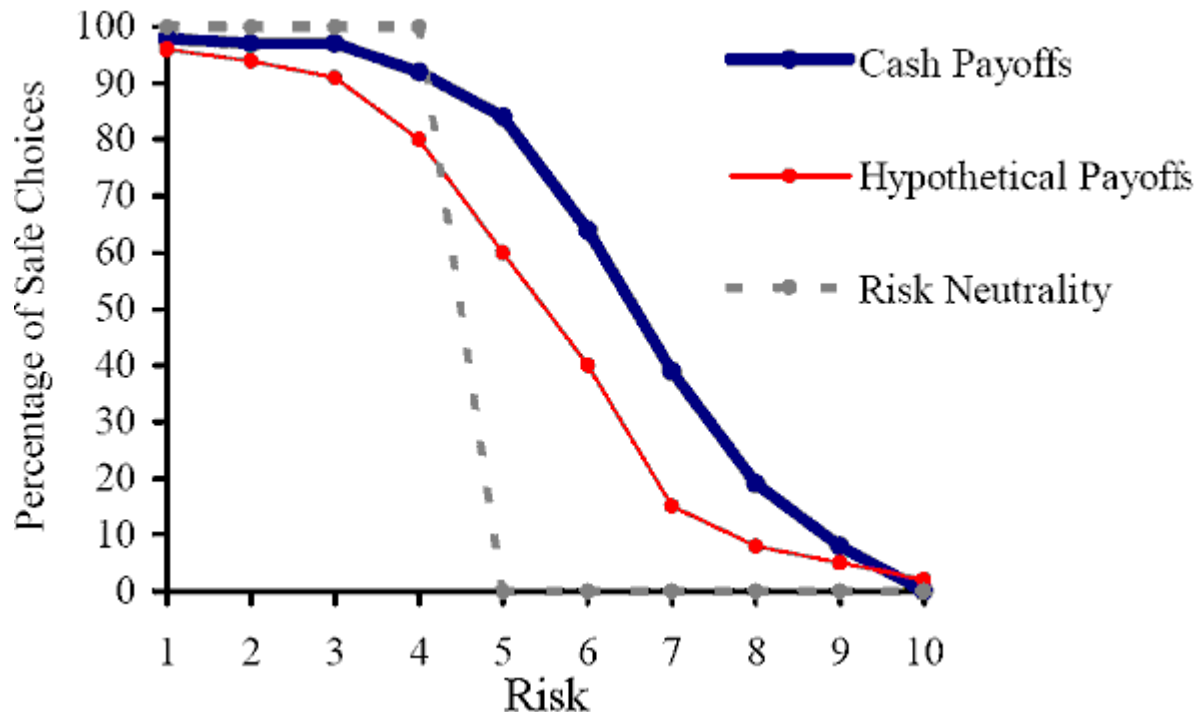


The experimental method

- **Common disputes**
 - Monetary incentives (performance pay)
 - Advantages:
 - Subject make more effort
 - Less noise
 - More consistency
 - Effect on average decisions disputed
 - Less ‘sociably desirable’ behavior
 - Disadvantages
 - Its expensive
 - Limits stakes
 - But, that is what grants are for ...

The experimental method

- **Common disputes**
 - Monetary incentives (performance pay)

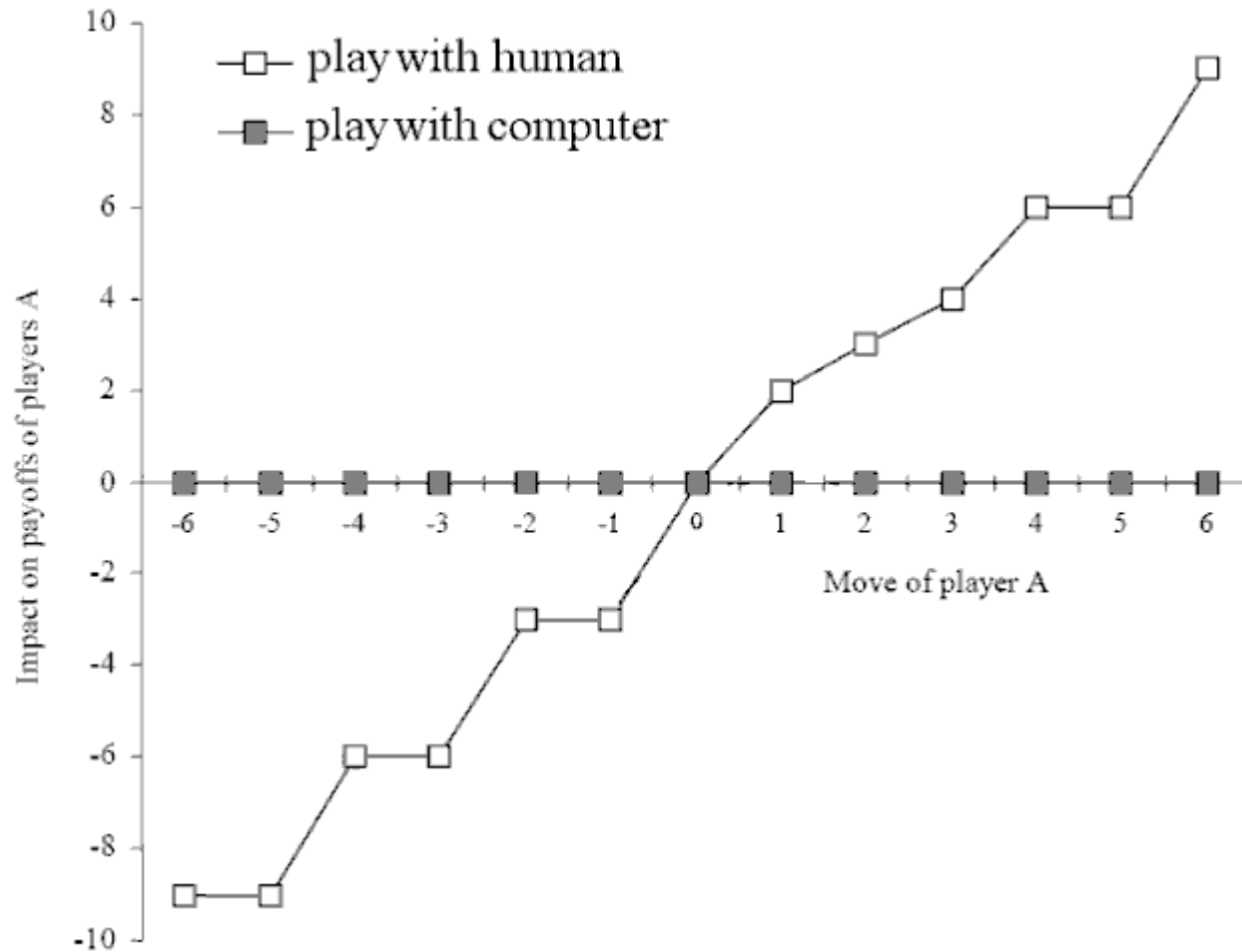


The experimental method

- **Common disputes**
 - Deception
 - Advantages:
 - Can lowers costs
 - Easier to study rare situations
 - Easier to design experiment
 - Disadvantages
 - Lose control if:
 - Subjects don't believe the instructions
 - Subjects try to outguess the experimenter

The experimental method

- **Common disputes**
 - Deception



The experimental method

- **Common disputes**
 - Choice of wording: abstract or concrete
 - Advantages of concrete wording:
 - Can help with understanding of the experiment
 - Can bring the experiment closer to research question
 - Disadvantages of concrete wording:
 - Lose control:
 - You don't know how subjects perceive their role
e.g. subjects might role-play a manager's behavior
- **Norm in experimental economics**
 - 'Neutral' language describing actions and their payoff consequences.

Course overview

- **Discussions:**
 - We talk about a part of the experimental economics literature
 - One of you presents between 1 and 4 papers a week
 - I'll present additional papers
 - You participate in simple experiments
- **Lab sessions:**
 - Hands-on class on how to use zTree
- **Design your own experiment**
 - To be ready by the end of the quarter