

Experimental/Behavioural Economics Nuremberg 2018

Brit Grosskopf

"Taking a course in experimental economics is a little like going to dinner at a cannibal's house. Sometimes you will be a diner, sometimes a part of dinner, sometimes both."

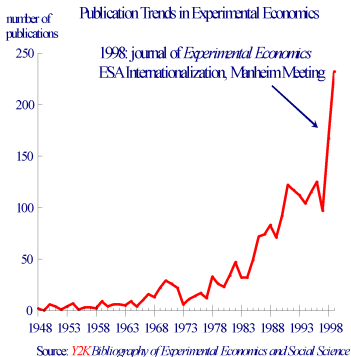
From *Experiments with Economic Principles* by Bergstrom and Miller

April 4, 2018

*"The principle of science, the definition almost, is the following:
The test of all knowledge is experiment. Experiment is the sole
judge of scientific 'truth'."*

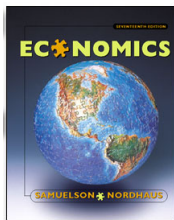
From *The Feynman Lectures on Physics*, Feynman (1963).

- ▶ Experimental Economics is probably the fastest growing field in economics today.



Can Economics be a Laboratory Science?

Samuelson and Nordhaus (1985) wrote in their introductory economics textbook more than a quarter-century ago:



"The economic world is extremely complicated. There are millions of people and firms, thousands of prices and industries. One possible way of figuring out economic laws in such a setting is by controlled experiments. A controlled experiment takes place when everything else but the item under investigation is held constant. Thus a scientist trying to determine whether saccharine causes cancer in rats will hold 'other things equal' and only vary the amount of saccharine. Same air, same light, same type of rat. "

“Economists have no such luxury when testing economic laws. They cannot perform the controlled experiments of chemists or biologists because they cannot easily control other important factors. Like astronomers or meteorologists, they generally must be content largely to observe.”

- ▶ Committed to the idea that economics, like all of the natural sciences, can be a laboratory science.



*"Facts do not come from the armchair,
but from careful observation and experimentation."*

Herbert Simon in Rubinstein, 1998

- ▶ Experimental work has been conducted in almost all fields of economics, including:
 - ▶ Industrial Organization,
 - ▶ Game Theory,
 - ▶ Public Finance,
 - ▶ Labor Economics,
 - ▶ Trade,
 - ▶ Development Economics and
 - ▶ Macroeconomics.
- ▶ This course can therefore complement your other research interests.

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- ▶ Show you what everyone, and particular economists, can learn from conducting controlled laboratory experiments.
- ▶ Compare what economic theory has to say about economic choices and strategic interactions and what people actually do when faced with strategic decisions.
- ▶ Teach you how to conduct your own experiment.

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- ▶ An effort will be made to concentrate on a *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.
- ▶ The aim of this course is to provide you with a solid understanding of the experimental methodology and to endow you with the tools to get started on an experimental research project.

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▶ **Journal of classroom experiments**

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Each entry should include:

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- (4) a summary of the results obtained in class and whether they differ from the theoretical predictions and
- (5) what you have learned from participating in the experiment and the subsequent class discussion (**personal take-away** as well as **what results mean for economics in general**).

The journal is meant to:

- ▶ to organize your thoughts,
- ▶ help you learn in this course.

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- ▶ Each class will touch on some aspects of these broad topics.
- ▶ You should look for connections between them.
- ▶ Don't get confused about what theory predicts and what one actually observes in the lab.

- ▶ For example, economic theory often assumes that economic agents are rational expected utility maximizers. Whether people do in fact maximize expected utility has been tested using economic experiments.

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- ▶ Experimental evidence can be for or against the predictions of economic theory. We will be talking about a lot of experiments in this class and you will be participating in quite a few. Always keep your eyes open as to how those experiments are conducted and record tips and tricks under “Experimental Design.”

My biggest Experiment





Experimental Economics – From Topic to Tool

Samuelson (2005) *JEL*

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- ▶ Math econ and econometrics started off as a topic pursued by specialists. Both moved to being tools and were shaped by issues arising in applications.
- ▶ Experimental economics is making its transition from topic to tool. **Once viewed sceptically, experiments are now commonplace and provide crucial data in most fields of economics.** (Nobel Prizes)

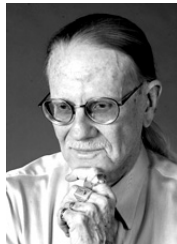
Nobel Prizes

1994
Game
Theory



Reinhard
Selten

2002
Experimental
Methods



Vernon L.
Smith

2009
Economic
Governance



Elinor
Ostrom

2012
Market
Design



Alvin E.
Roth

The Nobel Prize for Economics in 2017 went to Richard H. Thaler.



It is *“about the way actual people behave as opposed to the way economists think people behave – (like) people who are highly rational, unemotional creatures – kind of like Spock”* in the *Star Trek* TV series, Thaler explained. *“The people I study are humans that are closer to Homer Simpson.”*

“We humans don’t always choose the right thing,” he continued. *“Sometimes we overeat. Sometimes we exercise too little. Many of us have trouble saving enough for retirement.”*

<https://www.youtube.com/watch?v=QqJX5dlIsFw>

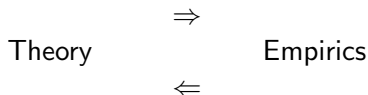


"The problem seems to be that while economists have gotten increasingly sophisticated and clever, consumers have remained decidedly human. This leaves open the question of whose behavior we are trying to model. Along these lines, at an NBER conference a couple of years ago I explained the difference between my models and Robert Barro's (a well-known rationalist) by saying that he assumes the agents in his model are as smart as he is, while I portray people as being as dumb as I am. Barro agreed with this assessment."

Richard H. Thaler, *The Winner's Curse*, 1994, pp.120–121.

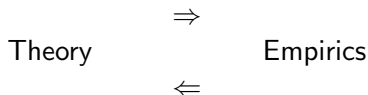
Why Experiments?

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- ▶ In an experiment you actively engage the world and create a learning opportunity that would otherwise not exist.



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- ▶ **Searching for facts (searching for meaning):** part of a dialogue among experimentalists.
- ▶ **Whispering in the ears of princes:** contribute to the dialogue between experimentalists and policy makers.

Some Design Objections

Schelling (1957)

- ▶ You and your two neighbors each have the letters A, B and C. Each of you is to write these three letters, A, B, C, in any order. If the order is the same on all of your three lists, then you each get a prize of \$6, otherwise you get nothing.

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- ▶ Is there a potential problem?

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- ▶ One of the first goals of experimental design is to protect ourselves from fooling ourselves into believing what we want to believe.
- ▶ Experiments are often done by people who are following up on their intuitions, and (often) investigating hypotheses that they believe to be true. 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 the reason that you believe.

What data to report?

Edward Leamer (1983) wrote a well-known critique of econometric practice (p.36–37):

“The econometric art as it is practiced at the computer terminal involves fitting many, perhaps thousands, of statistical models. One or several that the researcher finds pleasing are selected for reporting purposes. This searching for a model is often well intentioned, but there can be no doubt that such a specification search invalidates the traditional theories of inference. The concepts of unbiasedness, consistency, efficiency, maximum-likelihood estimation, in fact, all the concepts of traditional theory, utterly lose their meaning by the time an applied researcher pulls from the bramble of computer output the one thorn of a model he likes best, the one he chooses to portray as a rose. The consuming public is hardly fooled by this chicanery.”

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- ▶ When procedures and parameters are influenced by unreported pilot experiments, Leamer's critique is valid.
- ▶ There is room to do a better job: **report process with which data is collected, procedures designed and parameters chosen carefully!**

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- ▶ Precise replication gives little information about robustness. The ultimate indication for robustness is replication with some variation of experimental parameters and conditions. Series of experiments allow the experimental community to build upon and critique one another's work in ways that are not as readily available to economists using non-experimental methods.

“Columbus is viewed as the discoverer of America, even though every school child knows that the Americas were inhabited when he arrived, and that he was not even the first to have made a round trip, having been preceded by Vikings and perhaps by others. What is important about Columbus’ discovery of America is not that it was the first, but that it was the last. After Columbus, America was never lost again. ...”

(Roth and Sotomayor 1990, p. 170)

Outline for the Course

- ▶ Individual Decision Making
- ▶ Social Preferences
 - ▶ Bargaining
 - ▶ Trust and Gift-Exchange
 - ▶ Public Goods
- ▶ Incentives
- ▶ Gender
- ▶ ...

Individual Choice Behavior

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- ▶ One of the chief methodological debates concerns the use of **hypothetical** versus **real** choices.

Excurs: Induced Value Theory

Smith (1976): *“The laboratory becomes a place where real people earn real money for making real decisions about abstract claims that are just as “real” as a share of General Motors.”*

- ▶ Control is the essence of experimental methodology. It's important that we know that between two treatments/experiments, individual values either do or do not differ in a specified way. Such control can be achieved by using a reward structure to induce prescribed monetary value on actions. Concept of induced valuation depends upon *nonsatiation*.

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- ▶ *Given a costless choice between two alternatives, identical except that the first yields more of the reward medium (usually currency) than the second, the first will always be chosen (preferred) over the second, by an autonomous individual, i.e., utility is a monotone increasing function of the monetary reward, $U(M)$, $U' > 0$.”* Smith (1973)

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- ▶ Game value additional to monetary value of experimental outcomes (→ If monotone in reward, no problem, otherwise interesting outside options).
- ▶ Individuals may not be autonomous own-reward maximizers (→ Incomplete information, in market settings).

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- ▶ Part of what we will see is that there is some tension between two points of view about what we use theories for, what kinds of theories we seek, and how we test them.

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- ▶ On the other hand, economists are often looking for theories that will serve as **models**, i.e. as **good approximations of observed behavior**. Simple falsification may not cause us to reject such theories, since, of course, approximations are not true theories. But in that case, we have to think about how we will deal with falsifying data, to help us decide which models are useful, for what, under what circumstances, and when we can find better approximations.

Rubinstein (2001) again:

“My view about the meaning of economic theory leads me to find it hopeless and, more importantly, pointless to test the predictions of models in economic theory. However, when an economic model is based on intuitions about how people reason, experimental economics can verify these intuitions are not extrinsic. Experiments serve as a test of the plausibility of assumptions and not conclusions. When experimental economics feeds economic models it can suggest new ideas about human reasoning in economic situations.”

Let's do our first little experiment

- ▶ Half of you have just gotten a windfall gift of a classy, stylish, useful and highly desirable pen. Please examine it closely, try it out and admire the fine lines it delivers. Think of yourself taking notes with such an instrument. In what follows, you will be referred to as “*owners*.”

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- ▶ Half of you were not given a pen. You will be referred to as *“non-owners.”*
- ▶ Will each owner now please pass his/her pen to the neighboring non-owner, so that the non-owners can also fully examine the pen?

- ▶ Because I randomly chose who would become an owner, there may exist some possible gains from trade. In order to assess this, I would like to elicit from each owner the minimum price at which he/she would be willing to sell the pen. From each non-owner, I would like to elicit the maximum price she/he would be willing to pay in order to buy the pen.

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- ▶ Of course, eliciting the price is a problem that itself presents some challenges to experimental design.
- ▶ Becker, DeGroot, and Marschak (1964) designed a procedure that would give utility maximizers the incentive to truthfully reveal their reservation price.

Becker–DeGroot–Marschak Mechanism (BDM)

- ▶ *This is how it goes:* Each owner will write down an amount of money for which he/she would be willing to sell it, and each non-owner will write down a price for which he/she would be willing to buy it.

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- ▶ Next a random price will be determined by throwing a 20-sided die in order to determine a price between 0.10 Euros and 2.00 Euros.
- ▶ Each owner–nonowner pair will then transact (the non-owner will buy the pen from the owner at the random price) if and only if the random price is higher than the owner's demand and lower than the non-owners offer. Note that the transaction takes place at the random price, not at the stated “willingness to pay” (WTP)/“willingness to accept” (WTA).

- ▶ To state one's own reservation price (willingness to pay for the non-owner and willingness to accept for the owner) is a dominant strategy for a utility maximizer. That means that by overstating or understating the reservation price the non-owner or owner will miss some opportunity or be forced into some undesirable transaction. (Example)

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- ▶ Please write down a price!

Experimental Results

Owner's WTA	Non-Owner's WTP	Owner's WTA	Non-Owner's WTP

The fact that people often demand much more to give up an object than they would be willing to pay to acquire it. A good's value increases once it becomes part of an individual's endowment (Thaler, 1980).

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- ▶ Kahneman, Knetsch and Thaler (1990): Cornell university mugs, 11 should have traded, only 3 did.
- ▶ List (2003) asked the question "Does market experience eliminate market anomalies?".

Excurs: Field Experiments

- ▶ Field experiment: the “laboratory is the marketplace: Subjects would be engaging in similar activities whether I attended the event or went to the opera. In this sense, I am gathering data in the least obtrusive way possible while still maintaining the necessary control to execute a clean comparison between treatments. This highlights the naturalness of this particular setting, and the added realism associated with my field experiments.”

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 1. Asked them whether they'd be willing to fill out a questionnaire.

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- ▶ **Findings:** One example that market experience tends to eliminate endowment effect.

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- ▶ *How much would you pay to eliminate some risk that presently gives you a .001 chance of sudden death over the next five years?*
- ▶ *How much would you have to be paid to accept an additional .001 chance of sudden death over the next five years?*

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- ▶ *A company is making a small profit. It is located in a community experiencing a recession with substantial unemployment and inflation of 12 percent. The company decides to increase salaries only 5 percent this year.*
 - ▶ $N = 129$ Acceptable: 78% Unfair: 22%

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- ▶ **Loss aversion:** disutility of giving up an object is greater than the utility associated with acquiring it. (Kahneman and Tversky, 1984)

Our next experiment

Your Choices

	Probability of Winning	Amount if Win	Amount if Lose	Pref. Rev.
1 – I	14/36	\$8.50	-\$1.50	
2 – J	34/36	\$2.50	-\$0.50	
3 – G	4/36	\$40.00	-\$1.00	
4 – H	32/36	\$4.00	-\$0.50	
5 – E	34/36	\$3.00	-\$2.00	
6 – F	18/36	\$6.50	-\$1.00	
7 – C	29/36	\$2.00	-\$1.00	
8 – D	7/36	\$9.00	-\$0.50	
9 – A	35/36	\$4.00	-\$1.00	
10 – B	11/36	\$16.00	-\$1.50	
11 – K	18/36	\$5.00	-\$1.50	
12 – L	33/36	\$2.00	-\$2.00	

Preference Reversals

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- ▶ Two types of lotteries: “P” lotteries with high probabilities of winning, and “\$” lotteries with a high prize won with a small probability.
- ▶ Psychologists (Lichtenstein and Slovic, 1971) have observed that a large proportion of people indicate a preference for “P” lotteries, while they place a higher value on the other lottery, the “\$” bet. Lichtenstein and Slovic (1973) used volunteer participants in a Las Vegas Casino and replicated the findings.

(Grether and Plott, 1979) set out to “discredit the psychologists’ work as applied to economics.” They started with a list of 13 objections that would render the preference reversal phenomenon irrelevant.

- ▶ Mis-specified incentives (hypothetical choices, or point values not revealed until after the experiment).
- ▶ Income effects (all bets have positive expected value, over time, expected income raises, choices tend to be riskier).
- ▶ Indifference (choice of indifference was often not available, either or choice to be made).
- ▶ Strategic responses (by using words like “selling” and “buying”).
- ▶

Grether and Plott (1979) did not prevail. Preference reversals were somewhat more common in groups with financial incentives.

Pairs	Prob. of Win	Amount if Win	Amount if Lose	Type	Exp. value
A	35/36	\$4.00	-\$1.00	<i>P</i>	3.86
B	11/36	\$16.00	-\$1.50	\$	3.85
C	29/36	\$2.00	-\$1.00	<i>P</i>	1.42
D	7/36	\$9.00	-\$0.50	\$	1.35
E	34/36	\$3.00	-\$2.00	<i>P</i>	2.72
F	18/36	\$6.50	-\$1.00	\$	2.75
G	4/36	\$40.00	-\$1.00	\$	3.56
H	32/36	\$4.00	-\$0.50	<i>P</i>	3.50
I	14/36	\$8.50	-\$1.50	\$	2.39
J	34/36	\$2.50	-\$0.50	<i>P</i>	2.33
K	18/36	\$5.00	-\$1.50	\$	1.75
L	33/36	\$2.00	-\$2.00	<i>P</i>	1.67

(2) These are the same lotteries.

	Probability of Winning	Amount if Win	Amount if Lose	Corresp. letter
1	14/36	\$8.50	-\$1.50	I
2	34/36	\$2.50	-\$0.50	J
3	4/36	\$40.00	-\$1.00	G
4	32/36	\$4.00	-\$0.50	H
5	34/36	\$3.00	-\$2.00	E
6	18/36	\$6.50	-\$1.00	F
7	29/36	\$2.00	-\$1.00	C
8	7/36	\$9.00	-\$0.50	D
9	35/36	\$4.00	-\$1.00	A
10	11/36	\$16.00	-\$1.50	B
11	18/36	\$5.00	-\$1.50	K
12	33/36	\$2.00	-\$2.00	L

- ▶ The small print of any experiment is important.
- ▶ Minor differences in the wording of an experiment may be crucial.
- ▶ The method of selecting the data which is reported in a paper may affect the conclusion.