

Syllabus of “Experiments: Lab, Field, Natural, and Quasi”

Lecturers

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Overview

The objective of this course is to provide students with an understanding of causality in empirical research, and why experiments are so useful to uncover causal relationships. It is tailored for PhD students with an interest in doing research in areas such as behavioral economics, consumer behavior, organizational behavior, and strategy.

The course covers a variety of topics, including the formulation of research hypotheses, the construction of experimental designs in the lab and field, the development of experimental tasks and stimuli, how to avoid confounds and other threats to validity, procedural aspects of administering experiments, and the analysis of experimental data. We also discuss methods for observational data, where the researcher cannot actively design an experiment, but must rely on variation from natural or quasi experiments. We make heavy use of simulation to build an intuition for when these methods work well, and when they are better avoided.

Sessions are conducted in an interactive seminar format, with extensive discussion of concrete examples, challenges, and solutions.

The course is split into two parts:

1. Natural and quasi experiments (Peukert), sessions 1-7
2. Lab and field experiments (de Bellis), sessions 8-14

Prerequisites

A basic understanding of programming languages and statistics/econometrics is helpful but not required.

Schedule

For part 1, the class meets **Thursdays** from 13:15 to 16:45, starting September 23, 2021.

For part 2, the class meets **Wednesdays** from 13:15 to 16:45, starting November 10, 2021.

Depending on the COVID-19 situation, (parts of) the course may be held online via Zoom. If so, the Zoom link will be provided on Moodle.

Evaluation

Weekly readings and homework are a prerequisite to passing the course. The final grade consists of two group assignments and two individual exams.

40% group assignments

- Replication of research articles (part 1)

- Presentation of research articles (part 2)

60% individual exams

- Open book exam (part 1)
- Take-home exam (essay on design of an experiment; part 2)

Re-examination procedure: Students can redo failed assessments. The resits will be during the official resit examination period. The group class-room assignments can be redone individually, which will be evaluated with an oral presentation. The grade after resits will be calculated on the assessments that are redone along with the assessments that are not redone as per weighting scheme of the original syllabus.

Literature

Selected weekly readings (see section “Course structure”)

Textbooks:

- Angrist, J.D. and Pischke, J.S., 2008. Mostly harmless econometrics: An empiricist's companion. Princeton University Press.
- Baum, C.F., 2009. An introduction to Stata programming (Vol. 2). College Station: Stata Press.
- Cunningham, S., 2020. Causal inference: The mixtape. Yale University Press. Also available here: <https://www.scunning.com/mixtape.html>
- Einhorn, Martin, Michael Löffler, Emanuel de Bellis, Andreas Herrmann, and Pia Burghartz (2021), *The Machine Age of Customer Insight*, Bingley, UK: Emerald.

Course Structure

The following gives an overview of the individual sessions. Please note that this is a **preliminary version** that is subject to change.

Part 1: Natural and quasi experiments (Peukert)

Session 1 (September 23, 2021): Recap of basic concepts in statistics and introduction to Stata

- Content:
 - o Recap of basic concepts in statistics
 - Data generation processes
 - Simulation
 - Probability
 - Inference
 - o Introduction to Stata
 - Data types
 - Basic data manipulation
 - Basic programming: Macros and loops
 - Visualization
- Readings/Videos:
 - o Gary King, Data Generation Processes: <https://www.youtube.com/watch?v=kaL1KzDTotc>
 - o Gary King, Probability: <https://www.youtube.com/watch?v=6C7yRBfh2ok>
 - o Gary King, Theories of Inference: <https://www.youtube.com/watch?v=P79af1fkUsk>
 - o For further reference:

- Baum, C.F., 2009. An introduction to Stata programming (Vol. 2). College Station: Stata Press, Chapters 2-10.
- There are tons of helpful resources on the internet to learn Stata. Consider watching videos on YouTube. Google will often point you to Statalist for specific problems.

Session 2 (September 30, 2021): The regression model and the difference between correlation and causality

- Content:
 - The potential outcome model
 - Linear Regression
 - Panel data models
 - Dummy variables and interaction models
 - Why we need experiments and which type to choose when
- Readings/Videos:
 - Angrist and Pischke, Chapters 2-3
 - Cunningham, Chapter 9
 - Ben Lambert, Monte Carlo Simulation for estimators, An Introduction: https://www.youtube.com/watch?v=5nM5e2_1OQQ
 - Nick Huntington-Klein, Monte Carlo Simulation in Stata: <https://www.youtube.com/watch?v=-SKz6EhORqQ>

Session 3 (October 7, 2021): Natural experiments 1

- Content:
 - Introduction to experiments in observational data
 - Natural experiments
 - Difference-in-differences
 - Assumptions
 - Pitfalls
 - Communicating results
- Readings:
 - Angrist and Pischke, Chapter 5
 - Cunningham, Chapter 10
- Replication exercise:
 - Abouk, Rahi, and Scott Adams. 2013. "Texting Bans and Fatal Accidents on Roadways: Do They Work? Or Do Drivers Just React to Announcements of Bans?" American Economic Journal: Applied Economics, 5 (2): 179-99.
 - Moser, Petra, and Alessandra Voena. 2012. "Compulsory Licensing: Evidence from the Trading with the Enemy Act." American Economic Review, 102 (1): 396-427.

Session 4 (October 14, 2021): Natural experiments 2

- Content:
 - Synthetic control group
 - Assumptions
 - Pitfalls
 - Communicating results
- Readings:
 - Cunningham, Chapter 11

- Replication exercise:
 - Andersson, Julius J. 2019. "Carbon Taxes and CO₂ Emissions: Sweden as a Case Study." *American Economic Journal: Economic Policy*, 11 (4): 1-30.
 - Christian Helmers, Henry G. Overman, My Precious! The Location and Diffusion of Scientific Research: Evidence from the Synchrotron Diamond Light Source, *The Economic Journal*, Volume 127, Issue 604, September 2017, Pages 2006–2040

Session 5 (October 21, 2021): Natural experiments 3

- Content:
 - Regression discontinuity
 - Assumptions
 - Pitfalls
 - Communicating results
- Readings:
 - Angrist and Pischke, Chapter 6
 - Cunnigham, Chapter 7
- Replication exercise:
 - Bento, Antonio, Daniel Kaffine, Kevin Roth, and Matthew Zaragoza-Watkins. 2014. "The Effects of Regulation in the Presence of Multiple Unpriced Externalities: Evidence from the Transportation Sector." *American Economic Journal: Economic Policy*, 6 (3): 1-29.
 - Nekoei, Arash, and Andrea Weber. 2017. "Does Extending Unemployment Benefits Improve Job Quality?" *American Economic Review*, 107 (2): 527-61.

Session 6 (October 28, 2021): Quasi experiments 1

- Content:
 - Matching
 - Exact matching, propensity score matching
 - Assumptions
 - Pitfalls
 - Communicating results
- Readings:
 - Cunnigham, Chapter 6
- Replication exercise:
 - Piermartini, Roberta, and Linda Rousová. 2013. "The Sky Is Not Flat: How Discriminatory Is the Access to International Air Services?" *American Economic Journal: Economic Policy*, 5 (3): 287-319.
 - Guadalupe, Maria, Olga Kuzmina, and Catherine Thomas. "Innovation and Foreign Ownership." *American Economic Review* 102, no. 7 (December 2012): 3594–3627.

Session 7 (November 4, 2021): Quasi experiments 2

- Content:
 - Selection models
 - Assumptions
 - Pitfalls
 - Communicating results

- Instrumental variables
 - Assumptions
 - Pitfalls
 - Communicating results
- Readings:
 - Angrist and Pischke, Chapter 4
- Replication exercise:
 - Clark, Damon, and Emilia Del Bono. "The Long-Run Effects of Attending an Elite School: Evidence from the United Kingdom." *American Economic Journal: Applied Economics* 8, no. 1 (January 2016): 150–76.
 - Draca, Mirko, Stephen Machin, and Robert Witt. "Panic on the Streets of London: Police, Crime, and the July 2005 Terror Attacks." *American Economic Review* 101, no. 5 (August 2011): 2157–81.

Part 2: Lab and field experiments (de Bellis)

Session 8 (November 10, 2021): Basics in experimental research

- Content:
 - Introduction to scientific inquiry
 - Classification of the experimental method
 - Key characteristics of an experiment
 - Types of variables
 - Threats to validity
 - Examples from different disciplines
 - Overview of the experimental research process
- Readings:
 - Lonati, S., Quiroga, B. F., Zehnder, C., & Antonakis, J. (2018). On doing relevant and rigorous experiments: Review and recommendations. *Journal of Operations Management*, 64, 19-40.
- Student presentations:
 - Winer, R. S. (1999). Experimentation in the 21st century: The importance of external validity. *Journal of the Academy of Marketing Science*, 27(3), 349.

Session 9 (November 17, 2021): Lab experiments

- Content:
 - Types of experiments
 - Types of experimental paradigms
 - Formulation of research hypotheses
 - Dos and don'ts when designing lab experiments
- Readings:
 - Hertwig, R., & Ortmann, A. (2001). Experimental practices in economics: A methodological challenge for psychologists?. *Behavioral and Brain Sciences*, 24(3), 383-403.
- Student presentations:
 - Falk, A., & Heckman, J. J. (2009). Lab experiments are a major source of knowledge in the social sciences. *science*, 326(5952), 535-538.

Session 10 (November 24, 2021): Field experiments

- Content:
 - Field experimentation
 - A/B testing
 - Guest lecture by industry speaker
 - Increasing realism when doing research
 - Combination of lab and field experiments
 - Dos and don'ts when designing field experiments
- Readings:
 - Morales, A. C., Amir, O., & Lee, L. (2017). Keeping it real in experimental research—Understanding when, where, and how to enhance realism and measure consumer behavior. *Journal of Consumer Research*, 44(2), 465-476.
- Student presentations:
 - Eden, D. (2017). Field experiments in organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, 4, 91-122.
 - List, J. A. (2011). Why economists should conduct field experiments and 14 tips for pulling one off. *Journal of Economic Perspectives*, 25(3), 3-16.

Session 11 (December 1, 2021): Set up your experiment

- Content:
 - Samples and human participants
 - Power calculations
 - Procedural aspects of experiments:
 - Use of deception
 - Open science, preregistration, and replications
 - Ethical principles and code of conduct
 - IRB process at HEC
 - Hands-on introduction into survey design software
 - Dos and don'ts when setting up experiments
- Readings:
 - Ortmann, A., & Hertwig, R. (2002). The costs of deception: Evidence from psychology. *Experimental Economics*, 5(2), 111-131.
- Student presentations:
 - Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., & Kaiser, S. (2012). Guidelines for choosing between multi-item and single-item scales for construct measurement: a predictive validity perspective. *Journal of the Academy of Marketing Science*, 40(3), 434-449.
 - Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, 466(7302), 29-29.
 - Oppenheimer, D. M., Meyvis, T., & Davidenko, N. (2009). Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology*, 45(4), 867-872.

Session 12 (December 8, 2021): Run your experiment

- Content:
 - Data collection
 - Visit of HEC-LABEX
 - Hands-on introduction into crowdsourcing platforms
 - Dos and don'ts when running experiments
- Readings:

- Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, 22(11), 1359-1366.
- Student presentations:
 - Goodman, J. K., & Paolacci, G. (2017). Crowdsourcing consumer research. *Journal of Consumer Research*, 44(1), 196-210.

Session 13 (December 15, 2021): Analyze your experiment

- Content:
 - Overview of data analysis methods
 - Most used methods to analyze experiments
 - Interaction and moderation analysis
 - Exploring the process and issues with mediation analysis
 - Guest lecture on process tracing
 - Issues with null hypothesis significance testing
 - Use of collaboration tools such as GitHub
 - Dos and don'ts when analyzing experiments
- Readings:
 - Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, 25(1), 7-29.
 - Johnson, E. J., Schulte-Mecklenbeck, M., & Willemsen, M. C. (2008). Process models deserve process data: Comment on Brandstätter, Gigerenzer, and Hertwig (2006).
 - Spiller, S. A., Fitzsimons, G. J., Lynch Jr, J. G., & McClelland, G. H. (2013). Spotlights, floodlights, and the magic number zero: Simple effects tests in moderated regression. *Journal of Marketing Research*, 50(2), 277-288.
- Student presentations:
 - McShane, B. B., & Böckenholt, U. (2017). Single-paper meta-analysis: Benefits for study summary, theory testing, and replicability. *Journal of Consumer Research*, 43(6), 1048-1063.
 - Pieters, R. (2017). Meaningful mediation analysis: Plausible causal inference and informative communication. *Journal of Consumer Research*, 44(3), 692-716.

Session 14 (December 22, 2021): Interpret and report your experiment

- Content:
 - Generalizability of results
 - P-hacking and its consequences
 - Writing process
 - Structure of a scientific paper
 - How to avoid plagiarism
 - Figures and tables
 - Guest lecture on creating convincing figures
 - Dos and don'ts when reporting experiments
 - Instructions about preparation of essay on design of an experiment (evaluation)
- Readings:
 - Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: a key to the file-drawer. *Journal of Experimental Psychology: General*, 143(2), 534.
 - Bem, D. J., Zanna, M. P., & Darley, J. M. (1987). Writing the empirical journal. *The compleat academic: A practical guide for the beginning social scientist*, 171-201.
- Student presentations:

- Wicherts, J. M., Veldkamp, C. L., Augusteijn, H. E., Bakker, M., Van Aert, R., & Van Assen, M. A. (2016). Degrees of freedom in planning, running, analyzing, and reporting psychological studies: A checklist to avoid p-hacking. *Frontiers in Psychology, 7*, 1832.
- Meyvis, T., & Van Osselaer, S. M. (2018). Increasing the power of your study by increasing the effect size. *Journal of Consumer Research, 44*(5), 1157-1173.