GESIS Spring Seminar 2025
"Laboratory Experiments"

Lecturers: Florian Heine
Affiliation: Vrije Universiteit Amsterdam
Email: f.a.heine@vu.nl

Date: 24 – 28 March 2025
Time: Mo: 10:00 – 17:00, Tu – Fr: 09:00 – 16:00
Venue: hybrid (GESIS Cologne & online via Zoom)

About the Lecturers

Florian Heine is an Assistant Professor at Vrije Universiteit Amsterdam. His research focuses on decision-making in cooperation, competition, and corporate social responsibility. He has published in journals such as *Games and Economic Behavior* and the *Journal of Public Administration Research and Theory*. Florian holds a PhD in Economics from Maastricht University and has contributed to leadership programs, including the VU Leadership Academy. His teaching spans various institutions, including Amsterdam University College, where he co-coordinates a course on Behavioral Economics. His recent work examines the role of gender identity in competitive behavior and the ethics of business practices.

Selected Publications

- Wang, Heine & van Witteloostuijn (2023). Pro-social risk-taking and intergroup conflict: A volunteer's dilemma experiment. *Games and Economic Behavior*, *140*, 363-379. DOI:10.1016/j.geb.2023.04.003
- Heine, Van Witteloostuijn & Wang (2022). Self-sacrifice for the common good under risk and competition: An experimental examination of the impact of public service motivation in a volunteer's dilemma game. *Journal of Public Administration Research and Theory*, *32*(1), 217-232. DOI:10.1093/JOPART/MUAB017
- Heine & Strobel (2020). Reward and punishment in a team contest. *Plos One*, *15*(9), e0236544. doi: 10.1371/journal.pone.0236544

Course Description

This course provides a comprehensive introduction to laboratory experiments in the social and behavioral sciences, offering participants a unique opportunity to gain hands-on experience in designing, conducting, and analyzing lab-based studies. Laboratory experiments have become a crucial tool for testing theories and identifying causal relationships, especially in settings where observational data may suffer from biases and confounding variables. This course will equip participants with the skills necessary to understand and apply this powerful method to their own research.

The course is structured to cater to researchers from various backgrounds, including sociology, political science, and economics. No prior experience with experimental methods is required. We will cover essential topics such as the advantages of experimental designs, key principles of experiment construction (e.g., randomization and control), and different types of lab experiments, from individual decision-making to strategic interaction between groups. The course will also touch on modern developments in experimental economics, including trust and risk behavior, public goods, and gender differences in competitive settings.

Teaching will be conducted through a combination of interactive lectures, practical sessions, and group discussions for both onsite and online participants. A major part of the course will involve programming and running simple experiments using **zTree**, a widely-used software for conducting economic experiments. Participants will also have the chance to analyze experimental data using tools like **Stata** or **R**.

In addition to laboratory experiments, we will briefly introduce **online experimental platforms** such as **Prolific** and **MTurk**, discussing how they complement traditional lab-based approaches.

By the end of the course, participants will have acquired practical knowledge and the technical skills needed to design and run their own experiments, making this course ideal for anyone looking to incorporate experimental methods into their research.

Keywords
Laboratory experiments, experiment design, behavioral research.

Course Prerequisites
- A general interest in causal inference and behavioral research topics.
- Some experience with programming or willingness to learn the basics of experiment design software (e.g., zTree).
- Familiarity with statistical analysis and regression techniques (e.g., basic knowledge of running and interpreting multiple linear regression models in R, Stata, or similar software).

Target Group
You will find the course useful if:
- you are a social science researcher interested in applying experimental methods to study human behavior, decision-making, or social interactions;
- you are a PhD student, Postdoc, or advanced Master's student in sociology, political science, psychology, or related fields, seeking to incorporate laboratory experiments in your research;
- you want to design and conduct lab-based experiments, particularly to explore topics such as trust, cooperation, or competition;
- you want to gain hands-on experience in programming and running simple experiments;
- you are looking for practical guidance on how to analyze experimental data and interpret results for your research.

Course and Learning Objectives
By the end of the course you will:
- be able to design and implement laboratory experiments to investigate social and behavioral research questions;
- have gained practical experience in programming simple experiments using zTree (or alternative platforms) and running them with participants;
- understand key concepts in experimental design, including how to structure an experiment, write instructions, and collect data;
- be familiar with methods to analyze experimental data and draw meaningful conclusions for your own research;
- have a broader understanding of how experimental methods can be applied in social science research to answer causal questions.

Organizational Structure of the Course
The course will follow a dynamic structure with a blend of interactive lectures and hands-on sessions to ensure that participants can both grasp the theoretical foundations of laboratory experiments and apply them in practice. Each day will consist of approximately three hours of interactive lectures in the morning, followed by three hours of hands-on exercises in the afternoon. These exercises are designed to allow participants to develop their own first experiment, guided by the lecturer and teaching assistant (TA).

The practical sessions will involve participants working individually or in groups on designing and programming experiments, with close supervision and assistance. We will use **zTree** software for experiment programming and **Stata** or **R** for data analysis, with exercises focused on specific concepts covered in the morning lectures.

On Wednesday, onsite participants will visit the Cologne Laboratory for Economic Research (CLER) to conduct a simple experiment using each other as participants, putting their programming skills into practice in a real-world lab setting. Meanwhile, online participants will focus on finalizing their experiment designs to make them ready for implementation or run them in an interactive online environment. This experience will allow participants to collect data from their peers and later analyze these data using the tools introduced earlier in the course. By running their

own experiments, participants will gain valuable experience in managing all phases of a lab experiment—from design and programming to data collection and analysis.

Throughout the course, I will provide continuous support during exercise and lab sessions, offering feedback on experiment designs, assisting with programming issues, and guiding participants through the data analysis phase. The teaching assistant will also be available for consultations, helping to ensure that participants feel fully supported while working on their projects.

Participants are expected to actively engage with the material, collaborate in discussions, and work on their experiments during the hands-on sessions. This course is designed to be highly interactive and practical, ensuring that participants leave with a strong ability to conduct their own lab experiments in their respective fields.

Software and Hardware Requirements

As participant, you should bring your own laptop for use in the course. Before the course, please obtain a free **license** for using z-Tree and **download the software**. The program is licensed free of charge. To get a license, please, follow this **link**. Once you obtain your license, you will be able to download z-Tree from this webpage: **http://www.ztree.uzh.ch/downloads.html**.

Please also install either Stata or R/RStudio on your laptop prior to the course. The latest version of R is available for free at https://cran.r-project.org/, and RStudio is available at https://www.rstudio.com/. For those who need it, GESIS can provide short-term licenses for Stata for the duration of the course. You should also ensure that you have the rights to install additional packages, such as Stata ado-files or R packages, on your laptop during the course.

Course Contents

- Introduction to lab experiments in the social sciences
- Designing and programming economic and social experiments
- Practical implementation of lab experiments using zTree
- Data collection and management in experimental research
- Basic data analysis of experimental results using Stata or R
- Practical session at Cologne Laboratory for Economic Research (CLER) to run and analyze experiments.

Day-to-day Schedule and Literature

Day	Topic(s)
1	**Introduction to Laboratory Experiments**
	Morning Session: (Lecture) • Introduction to the course and its objectives. • Fundamentals of laboratory experiments: Key concepts and methodology. • Types of experiments: laboratory, field, natural and online (e.g., Prolific and MTurk). Core principles of experimental design: randomization, treatment/control groups. • Overview of ethics in experimental research (IRB approval, informed consent). Afternoon Session: (Tutorial) • Hands-on: Designing a simple paper and pen experiment (basic setup). • Group work: Randomization, treatment, and control group setup. • Optional: Setting up an online experiment on Prolific/MTurk. Required Reading: • Falk, A., & Heckman, J. J. (2009). Lab experiments are a major source of knowledge in the social sciences. *Science*, *326*(5952), 535-538. DOI:10.1126/science.1168244

	Suggested Reading: • Guala, F. (2005). *The methodology of experimental economics*. Cambridge University Press (Ch. 2). DOI:10.1017/S0266267107001605
2	**Designing Experiments**
	Morning Session: (Lecture) • Steps in designing experiments: hypotheses, treatments, and control groups. • Designing experiments for decision-making under risk, trust, and public goods. • Power analysis and sample size determination for lab experiments. • Class discussion: Critique designs of well-known studies. • zTree overview: interface and basic functionalities. Programming simultaneous and sequential games in zTree. Afternoon Session: (Tutorial) • Power analysis exercise using R/Stata/G*Power. • Group/individual work: Designing a (detailed) laboratory experiment, specifying hypotheses and treatments. • Hands-on: Build a simple experiment in zTree. Required Reading: • Fischbacher, U. z-Tree: Zurich toolbox for ready-made economic experiments. *Exp Econ* **10**, 171–178 (2007). https://doi.org/10.1007/s10683-006-9159-4. Suggested Reading: • Fehr, E., Kirchsteiger, G., & Riedl, A. (1993). Does fairness prevent market clearing? An experimental investigation. *The Quarterly Journal of Economics*, *108*(2), 437-459. DOI:10.2307/2118338 • Roth, A. E., Prasnikar, V., Okuno-Fujiwara, M., & Zamir, S. (1991). Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An experimental study. *The American Economic Review*, 1068-1095. https://www.researchgate.net/publication/4980524_Bargaining_and_Market_Behavior_in_Jerusalem_Ljubljana_Pittsburgh_and_Tokyo_An_Experimental_Study • Guala, F. (2005). *The methodology of experimental economics*. Cambridge University Press (Ch. 3). DOI:10.1017/S0266267107001605
3	**Conducting Experiments (Afternoon Session at Cologne Laboratory for Economic Research (CLER) for Onsite Participants)**
	Morning Session: (Lecture/Lab mixed) • Practical issues: recruitment, instructions, and pilot testing. • Data collection and organization. • Managing logistics and data collection in a controlled environment. • Overview of Prolific and MTurk for online experiments. Afternoon Session: (Lab/Online-Tutorial) • Mock experiment: Participants take roles as subjects and experimenters. • Running a lab experiment using zTree.

	• Debrief on challenges encountered during the mock experiment. Required Reading: • Z-Tree User manual version 5.1 (Sections 1-2) Suggested Reading: • Horton, J.J., Rand, D.G. & Zeckhauser, R.J. The online laboratory: conducting experiments in a real labor market. *Exp Econ* **14**, 399–425 (2011). https://doi.org/10.1007/s10683-011-9273-9 • Mason, W., Suri, S. Conducting behavioral research on Amazon's Mechanical Turk. *Behav Res* 44, 1–23 (2012). https://doi.org/10.3758/s13428-011-0124-6
4	**Analyzing Experimental Data**
	Morning Session: (Lecture) • Data analysis: Descriptive statistics, hypothesis testing, and regression analysis for lab data • Common statistical techniques: t-tests, ANOVA, regression. • Addressing issues: sample size, power analysis, and robustness checks. Afternoon Session: (Tutorial) • Hands-on: Analyzing experimental data from the mock experiment. • Interpretation of statistical output and first discussion of findings. Required Reading: • Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press (Ch. 2). https://www.researchgate.net/publication/51992844_Mostly_Harmless_Econometrics_An_Empiricist's_Companion Suggested Reading: • Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press (Ch. 3). https://www.researchgate.net/publication/51992844_Mostly_Harmless_Econometrics_An_Empiricist's_Companion
5	**Applications and Presentations**
	Morning Session: (Lecture) • Exploring advanced experimental paradigms (e.g., public goods and institution formation, trust and trustworthiness, antisocial behavior and conflict). • Multilevel and clustered data analysis in lab experiments. • Reporting results and addressing reproducibility. Afternoon Session: (Discussion/Presentation) • Informal (Group) presentations: Presenting experimental designs and results. • Feedback and wrap-up: Discussing challenges, future research directions, and applications of lab experiments. Required Reading:

- Camerer, C.F., Dreber, A., Holzmeister, F. *et al.* Evaluating the replicability of social science experiments in *Nature* and *Science* between 2010 and 2015. *Nat Hum Behav* **2**, 637–644 (2018). https://doi.org/10.1038/s41562-018-0399-z.

Suggested Reading:
- Croson, R., & Gächter, S. (2010). The science of experimental economics. *Journal of Economic Behavior & Organization*, *73*(1), 122-131. DOI:10.1016/j.jebo.2009.09.008

Recommended Literature to Look at in Advance
None.

Additional Recommended Literature
None.