Centre for Experimental Social Sciences
Nuffield College, University of Oxford

# Experimental Methods
# Department of Political Science and International Relations
# Trinity Term 2018

**Course Objectives**

The course covers the design, implementation, and analytic tools necessary for conducting social science experiments and analysing experimental data. Module 1, that occurs during Weeks 1 through 4 of Trinity Term, will focus on laboratory, online and field experiments. The module begins in Week 1 with a brief review of causal inference and potential outcomes as they relate to experimental design; estimating Average Treatment Effects, covariates and regression in analyzing experimental results, and power calculations. Week 2 will focus on Randomization Inference (RI) including hypothesis testing, p-values sharp nulls and RI regression. Week 3 will concern the design, implementation and analysis of what I label as robust multi-mode experiments. Week 4 covers special topics including mediation, trees, random forest, and experiments on social media. During Module 1, there will be optional introduction to R programming classes that are conducted by Dr. Sönke Ehret.

Module 2 is entirely optional and students will not be examined on this material. It will occur in Weeks 5 through 8 of Trinity Term, participants will learn how to program experiments with o-Tree, work with the subject recruitment software, analyse experimental data and run a lab experiment at the Nuffield Centre for Experimental Social Sciences (CESS). In addition, participants will learn how to programme online experiments in Qualtrics and how to work with crowd-sourced subject pools. Module 2 will also have a TESS (Time Share Experiments in the Social Sciences) component. In this component of the course, students will have an opportunity to design a short experiment that would be competitively evaluated for inclusion in large scale cross-national CESS Online omnibus experimental study. The subject payment costs and fielding costs would be covered by CESS – again subject to the competitive evaluation process which could require changes in project budgets.

Participants will have the opportunity to present their own experimental research and receive feedback from an experienced team of instructors. Upon completion of the course participants should be able to (1) formulate research questions that can be addressed using experiments, (2) design and carry out experiments, and (3) analyse and interpret results from social sciences experiments.

The course is appropriate for participants from any discipline who expect to include

experimental social research as part of their research agenda. It is also appropriate for participants who want to become informed consumers of experimental research scholarship.

**Course Prerequisites**

Participants should have a basic background in research design and statistics. For example, with respect to research design, they should understand basic concepts such as causal inference, exogeneity, control group, and confounding effects. With respect to basic statistics, they should understand the principals of ordinary least squares regression; how to calculate simple measures of association; and have some familiarity with a statistical software package. The hands-on experimental data analysis lab sessions will use R.

**Course Location**

Course lectures will be held in Nuffield College: Week 1 is in the Clay Room; Weeks 2 through 8 are in the Large Lecture Room (LLR); and lab sessions will be held at the CESS Lab.

**Course Materials and Logistics**

All materials are available online on OSF at https://bit.ly/2vPge8z. Students are requested to bring an Internet enabled device such as laptop or ipad.

**Course Assignments**

In order to receive credit students submit a final proposal at the end of term. The proposal outlines a research question and an experimental design to address the question. Furthermore, each week will cover short in class experiments based on the oTree software. Students are expected to participate in these sessions and are required to submit data analysis assignments based on the experimental data gathered this way. Finally, students are required to write a one page critical response paper on one of presentations given in the CESS seminar or selected colloquiua. A google sheet will be provided were students can sign up for the seminars/colloquiua. The paper should either provide an extension of the presented experiment, or a critique.

**Course Schedule**

Lectures take place on each Tuesday of Trinity Term at 16:30. The course is organised into two modules. Module 1 takes place during Weeks 1 through 4 of Trinity Term. A second, optional, Module 2 will be available to interested students and it will take place during Weeks 5 through 8 of Trinity Term. The first module will focus on experimental design and methods. The second module will provide students with instruction in o-Tree and Qualtrics programming – these are programming skills that are helpful for programming lab and online experiments. In addition Module 2 will have a TESS component.

| Module 1 | | | | |
|---|---|---|---|---|
| Day | Time | Place | Topic | Instructor |
| 24 April | 16:30 - 18:30 | CR | Causal inference, design, ATE, and power | rd |
| 1 May | 16:30 - 18:30 | LLR | Randomization Inference (RI) | rd |
| | 18:30 - 19:30 | LLR | G&G Exercise Using R (ex3.4, 3.6) | se |
| 8 May | 16:30 - 18:30 | LLR | Robust multi-mode experiments | rd |
| | 18:30 - 19:30 | LLR | G&G Exercise Using R (ex4.2, 4.9) | se |
| 15 May | 16:30 - 18:30 | LLR | Special topics: mediation, tree, random forest, social media | rd |
| | 18:30 - 19:30 | LLR | G&G Exercise Using R (ex5.8, 5.10) | se |

| Module 2 | | | | |
|---|---|---|---|---|
| Day | Time | Place | Topic | Instructor |
| 22 May | 16:30 - 18:30 | CL | o-Tree One | se |
| 29 May | 16:30 - 18:30 | CL | o-Tree Two | se |
| 5 June | 16:30 - 18:30 | CL | Programming Online Survey Experiment in Qualtrics | se |
| 12 June | 16:30 - 18:30 | CL | TESS | se & rd |

CL: CESS Lab; LLR Nuffield Large Lecture Room
rd: Ray Duch; se: Sönke Ehret

## Instructors

Raymond Duch

Official Fellow of Nuffield College and Director of CESS
Research interests: Comparative political economy, political behaviour, experimental methods

Sönke Ehret

Research Officer at Nuffield College CESS Research interests: Online experiments, quantitative methods

## Reading lists

### Week 1: Causal inference, treatment effects, covariates, attrition, design, and power

Background

- Joshua D. Angrist and Jorn-Steffen Pischke. *Mastering Metrics: The Path from Cause to Effect*. Princeton University Press, Princeton, NJ, 2014 Chapters 1-3.
- Stephen L. Morgan and Christopher Winship. *Counterfactuals and Causal Inference: Methods and Principals for Social Research*. Cambridge University Press, 2007 Chapters 1-2.

Core Readings

- Alan S. Gerber and Donald P. Green. *Field Experiments: Design, Analysis, and Interpretation*. W.W. Norton & Company, Inc., New York, 2012.

    - Chapters 1, 2, 4, 6
    - R scripts and data sets used in the book http://isps.yale.edu/FEDAI
  - Imai Kosuke. *Quantitative Social Science: An Introduction*. Princeton University Press, Princeton, NJ, 2018
    - Chapters 2
    - R scripts and data sets used in the book http://isps.yale.edu/FEDAI

  Article Illustrations

  - Alan S. Gerber, D.P. Green, and C.W. Larimer. Social pressure and voter turnout: Evidence from a large-scale field experiment. *American Political Science Review*, 102:33–48, 2008
  - Alan S. Gerber and D.P. Green. The effects of canvassing, direct mail, and telephone contact on voter turnout: A field experiment. *American Political Science Review*, 94:653–63, 2000
  - David W. Nickerson. Is voting contagious? evidence from two field experiments. *American Political Science Review*, 102(1):49?57, 2008

  Code

  - Alexander Coppock. Design and analysis of experiments with randomizr. May 2017
  - Peter M. Aronow. ri: R package for performing randomization-based inference for experiments. February 2015

**Week 2: Randomization Inference**

  Readings

  - Susan Athey and Guido Imbens. The econometrics of randomized experiments. *Handbook of Economic Field Experiments*, 1:73–140, 2017
  - Alan S. Gerber and Donald P. Green. *Field Experiments: Design, Analysis, and Interpretation*. W.W. Norton & Company, Inc., New York, 2012.
    - Chapters 3-5
    - R scripts and data sets used in the book http://isps.yale.edu/FEDAI

  Article Illustrations

  - Daniel E Ho and Kosuke Imai. Randomization inference with natural experiments. *Journal of the American Statistical Association*, 101(475):888–900, 09 2006
  - Jason T. Kerwin and Rebecca L. Thornton. Making the grade: The sensitivity of education program effectiveness to input choices and outcome measures. University of Minnesota, 2018

**Week 3: Multi-modes**

  Readings

- David E. Broockman, Joshua L. Kalla, and Jasjeet S. Sekhon. The design of field experiments with survey outcomes: A framework for selecting more efficient, robust, and ethical designs. *Political Analysis*, 25(4):435?464, 2017
- Alexander Coppock and Donald P. Green. Assessing the correspondence between experimental results obtained in the lab and field: A review of recent social science research. *Political Science Research and Methods*, 3(1):113?131, 2015.
- Raymond Duch, Denise Laroze, and Pablo Beramendi. Comparing modes and samples in experiments. Nuffield Centre for Experimental Social Sciences Working Paper, 2017.

Field Experiments

- Marianne Bertrand, Simeon Djankov, Rema Hanna, and Sendhil Mullainathan. Obtaining a driver's license in india: An experimental approach to studying corruption. *Quarterly Journal of Economics*, 122(4):1639–76, 2007
- Marianne Bertrand and Sendhil Mullainathan. Are emily and greg more employable than lakisha and jamal? *American Economics Review*, 94:991, 2004
- Karthik Muralidharan and Venkatesh Sundararaman. Teacher performance pay: Experimental evidence from india. *Journal of Political Economy*, 119(1):39–77, 2011

Online

- Adam J. Berinsky, Gregory A. Huber, and Gabriel S. Lenz. Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*, 20(3):351?368, 2012
- Daniel G. Goldstein, Siddharth Suri, R. Preston McAfee, Matthew Ekstrand-Abueg, and Fernando Diaz. The economic and cognitive costs of annoying display advertisements. *Journal of Marketing Research*, 51(6):742–752, 2014
- Ryan T. Moore and Sally A. Moore. Blocking for sequential political experiments. *Political Analysis*, 21(4):507?523, 2013

Conjoint

- Jens Hainmueller, Daniel J. Hopkins, and Teppei Yamamoto. Causal inference in conjoint analysis: Understanding multidimensional choices via stated preference experiments. *Political Analysis*, 531:1–30, 2013
- Naoki Egami and Kosuke Imai. Causal interaction in factorial experiments: Application to conjoint analysis. Princeton University, 2016
- Jens Hainmueller, Dominik Hangartner, and Teppei Yamamoto. Validating vignette and conjoint survey experiments against real-world behavior. *Proceedings of the National Academy of Sciences*, 112(8):2395–2400, 2015
- Raymond M. Duch, Denise Laroze, Constantin Reinprecht, and Thomas S. Robinson. Where will the british go and why? Nuffield College Centre for Experimental Social Sciences Working Paper Series, 2018

List and Endorsement

- Graeme Blair, Kosuke Imai, and Jason Lyall. Comparing and combining list and endorsement experiments: Evidence from afghanistan. *American Journal of Political Science*, 58(4):1043–1063, 2014

**Week 4: Special Topics**

Mediation

- Kosuke Imai, Luke Keele, Dustin Tingley, and Teppei Yamamoto. Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies. *American Political Science Review*, 105(04):765–789, 2011
- Tyler J. VanderWeele. A unification of mediation and interaction: A 4-way decomposition. *Epidemiology*, 25(5):749–761, 2014

Tree and Random Forest

- Susan Athey and Guido Imbens. Recursive partitioning for heterogeneous causal effects. *Proceedings of the National Academy of Sciences*, 113(27):7353–7360, 2016

Social Media

- Justin Grimmer, Solomon Messing, and Sean J. Westwood. How words and money cultivate a personal vote: The effect of legislator credit claiming on constituent credit allocation. *American Political Science Review*, 106(4):703?719, 2012
- Robert M. Bond, Christopher J. Fariss, Jason J. Jones, Adam D. I. Kramer, Cameron Marlow, Jaime E. Settle, and James H. Fowler. A 61-million-person experiment in social influence and political mobilization. *Nature*, 489:295 EP –, 09 2012

# References


[1] Joshua D. Angrist and Jorn-Steffen Pischke. *Mastering Metrics: The Path from Cause to Effect*. Princeton University Press, Princeton, NJ, 2014.

[2] Peter M. Aronow. ri: R package for performing randomization-based inference for experiments. February 2015.

[3] Susan Athey and Guido Imbens. Recursive partitioning for heterogeneous causal effects. *Proceedings of the National Academy of Sciences*, 113(27):7353–7360, 2016.

[4] Susan Athey and Guido Imbens. The econometrics of randomized experiments. *Handbook of Economic Field Experiments*, 1:73–140, 2017.

[5] Adam J. Berinsky, Gregory A. Huber, and Gabriel S. Lenz. Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*, 20(3):351?368, 2012.

[6] Marianne Bertrand, Simeon Djankov, Rema Hanna, and Sendhil Mullainathan. Obtaining a driver's license in india: An experimental approach to studying corruption. *Quarterly Journal of Economics*, 122(4):1639–76, 2007.

[7] Marianne Bertrand and Sendhil Mullainathan. Are emily and greg more employable than lakisha and jamal? *American Economics Review*, 94:991, 2004.

[8] Graeme Blair, Kosuke Imai, and Jason Lyall. Comparing and combining list and endorsement experiments: Evidence from afghanistan. *American Journal of Political Science*, 58(4):1043–1063, 2014.

[9] Robert M. Bond, Christopher J. Fariss, Jason J. Jones, Adam D. I. Kramer, Cameron Marlow, Jaime E. Settle, and James H. Fowler. A 61-million-person experiment in social influence and political mobilization. *Nature*, 489:295 EP –, 09 2012.

[10] David E. Broockman, Joshua L. Kalla, and Jasjeet S. Sekhon. The design of field experiments with survey outcomes: A framework for selecting more efficient, robust, and ethical designs. *Political Analysis*, 25(4):435?464, 2017.

[11] Alexander Coppock. Design and analysis of experiments with randomizr. May 2017.

[12] Alexander Coppock and Donald P. Green. Assessing the correspondence between experimental results obtained in the lab and field: A review of recent social science research. *Political Science Research and Methods*, 3(1):113?131, 2015.

[13] Raymond Duch, Denise Laroze, and Pablo Beramendi. Comparing modes and samples in experiments. Nuffield Centre for Experimental Social Sciences Working Paper, 2017.

[14] Raymond M. Duch, Denise Laroze, Constantin Reinprecht, and Thomas S. Robinson. Where will the british go and why? Nuffield College Centre for Experimental Social Sciences Working Paper Series, 2018.

[15] Naoki Egami and Kosuke Imai. Causal interaction in factorial experiments: Application to conjoint analysis. Princeton University, 2016.

[16] Alan S. Gerber and Donald P. Green. *Field Experiments: Design, Analysis, and Interpretation*. W.W. Norton & Company, Inc., New York, 2012.

[17] Alan S. Gerber and D.P. Green. The effects of canvassing, direct mail, and telephone contact on voter turnout: A field experiment. *American Political Science Review*, 94:653–63, 2000.

[18] Alan S. Gerber, D.P. Green, and C.W. Larimer. Social pressure and voter turnout: Evidence from a large-scale field experiment. *American Political Science Review*, 102:33–48, 2008.

[19] Daniel G. Goldstein, Siddharth Suri, R. Preston McAfee, Matthew Ekstrand-Abueg, and Fernando Diaz. The economic and cognitive costs of annoying display advertisements. *Journal of Marketing Research*, 51(6):742–752, 2014.

[20] Justin Grimmer, Solomon Messing, and Sean J. Westwood. How words and money cultivate a personal vote: The effect of legislator credit claiming on constituent credit allocation. *American Political Science Review*, 106(4):703?719, 2012.

[21] Jens Hainmueller, Dominik Hangartner, and Teppei Yamamoto. Validating vignette and conjoint survey experiments against real-world behavior. *Proceedings of the National Academy of Sciences*, 112(8):2395–2400, 2015.

[22] Jens Hainmueller, Daniel J. Hopkins, and Teppei Yamamoto. Causal inference in conjoint analysis: Understanding multidimensional choices via stated preference experiments. *Political Analysis*, 531:1–30, 2013.

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[25] Jason T. Kerwin and Rebecca L. Thornton. Making the grade: The sensitivity of education program effectiveness to input choices and outcome measures. University of Minnesota, 2018.

[26] Imai Kosuke. *Quantitative Social Science: An Introduction*. Princeton University Press, Princeton, NJ, 2018.

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[30] David W. Nickerson. Is voting contagious? evidence from two field experiments. *American Political Science Review*, 102(1):49?57, 2008.

[31] Tyler J. VanderWeele. A unification of mediation and interaction: A 4-way decomposition. *Epidemiology*, 25(5):749–761, 2014.