Improving Research Designs for Causal Inference

Content. Talk about big sections.

Audience. Talk about MA course and/or Ph.D. research design course textbook as motivation that also remains as a handbook for researchers.

Format. Three sections per chapter (theory/concept, lab; exercises). Theory/concept section includes substantial interactive content using Shiny. Lab demonstrates how to implement in R (from scratch) and then using DeclareDesign. Exercises build on lab to try on your own, perhaps using Swirl or the DataCamp tools. Open access.

Chapter Outline

Chapter: Preface

* 1. Simplify
  2. Ask fewer questions
  3. Dispositive

Part 1: Declaring and Diagnosing Research Designs

Chapter: Model, Inquiry, Research Strategy, Answer

Lab: Declare two arm trial normal outcome with complete RA

Chapter: Diagnosing a Design

Diagnosands

Diagnosand-completeness

Lab: Diagnose power and bias of two arm trial

Chapter: Improving a Design

Lab: what size n do you need

Exercises: how good would your covariates need to be

Part 2: Experimental Designs

Chapter: Studying a Single Treatment

Blocking

Clustering

Network designs

Multiple outcomes

Scales

Baseline/endline/frequent measurement

Treatment effect heterogeneity

Multiple comparisons

Chapter: Studying Multiple Treatments

What estimands?

Factorial designs

Conjoint Designs

Within-subjects designs (step-wedge, cross-over, etc.)

Dosage and clustered treatment intensity designs

Chapter: Studying Causal Mechanisms

Chapter: External Validity

Pate vs Sate

Sampling to target PATE

Analogy of simple, stratified, clustered to random assignment

Estimation strategies to target PATE

Chapter: Violations of Experimental Assumptions

Randomization failure (discussion of balance test fallacy etc.)

Noncompliance

Attrition

Interference

Diagnosing designs under violations

Designs to minimize violations

Part 3: Observational designs

Chapter: Checking assumptions, bounds, and sensitivity analyses

Lab: Selection on Observables

Chapter: Common Designs

RD

Difference-in-differences

Synthetic control and generalized synthetic control

IV

Process tracing

Part 4: Scientific Practices

Chapter: Preanalysis Plans / Registration / SOPs

Chapter: Reconciliation / Replication

Lab: design replication (Bjorkman and Svennson?)

Chapter: Meta-analysis and multi-site studies

Part 5: Conclusion

Beyond causal inference: using declare + diagnose for descriptive inference, discovery, parameter estimation, etc. [ A version of the “common designs” section of the paper ]

Appendices