

Introduction to Experiments

February 4

Outline for today

1. Introductions
2. Overview of course
3. Introduction to experiments
4. Preview of next week
5. In-class exercise

Introductions

- Name tags
- Go-around
 - Who are you?
 - What do you want to do after your education?

Outline for today

1. Introductions
2. Overview of course
3. Introduction to experiments
4. Preview of next week
5. In-class exercise

Overview

- Meet for 10 weeks
- Small assignments on some weeks (presentations, etc.)
- Synopsis presentations on:
Mar 25, Apr 8, Apr 15
- Individual meetings with me after
April 15
- Light reading load

Overview

Exam

- Propose an experimental study on a relevant topic from any area of political science
- Topic is completely up to you
- May be useful preparation for a masters thesis
- Assume 400 pages of individual reading for the exam

Overview

Exam

Contents:

- Question, theory, and hypotheses
- Design
 - Stimulus/treatment materials
 - All measures
 - Complete "protocol"
- Planned statistical analysis
 - Accounts for possible data challenges
- Discuss feasibility and ethics
- Discuss external validity and contribution

Overview

Part 1

Exam

- 4.1 Introduction to Political Science Experiments (Feb 4)

Schedule

- 4.2 Concepts, Research Questions, and Hypotheses (Feb 11)
- 4.3 Internal Validity and Experimental Design (Feb 18)
- 4.4 Analysis of Experiments (Feb 25)
- 4.5 Practical Issues and Challenges (Mar 4)

Overview

Part 2

Exam

- 4.6 Examples: Laboratory Experiments (Mar 11)

Schedule

- 4.7 Examples: Field Experiments (Mar 18)
- 4.8 Examples: Survey Experiments (Mar 25)

Presentations start on Mar 25

Overview

Part 3

Exam

- No class (Apr 1)
- 4.9 External Validity (Apr 8)
- 4.10 Effect Sizes, Meta-Analysis, Decision Making (Apr 15)

Schedule

Presentations on Apr 8 and Apr 15

Outline for today

1. Introductions
2. Overview of course
3. Introduction to experiments
4. Preview of next week
5. In-class exercise

History of experiments

- American Political Science Association president A. Lawrence Lowell:

“We are limited by the impossibility of experiment. Politics is an observational, not an experimental science...”

- Experiments prominent in psychology, natural sciences
- King, Keohane, and Verba (1994) only mentions experiments once
- Since ~2000, "credibility revolution"

Uses of Experiments

Alvin Roth, Stanford, 2012 Nobel Prize winner

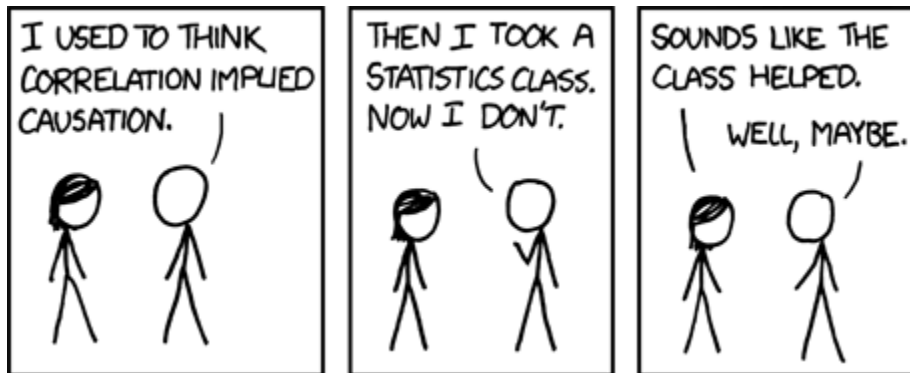
- Searching for facts
- Speaking to theorists
- Whispering in the ears of princes

Types of Experiments

- Lab: treat in a controlled research environment
- Field: treatment occurs in course of everyday life
- Survey: treatment occurs outside of the control of the research

Causality

- Correlation



Causality

- Correlation
- Physical causality
- Philosophical perspectives

Hume

Three tenets

1. Spatial/temporal contiguity
2. Temporal succession
3. Constant conjunction

Four (or five) principles of causality

A more modern take involves 4-5 principles:

- Relationship
- Direction (temporality)
- Nonconfounding
- Mechanism
- Appropriate level of analysis

Mill's Methods

Agreement

If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree, is the cause (or effect) of the given phenomenon.

Mill's Methods

Agreement

Difference

If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance save one in common, that one occurring only in the former; the circumstance in which alone the two instances differ, is the effect, or cause, or an necessary part of the cause, of the phenomenon.

Mill's Methods

Agreement

Difference

Agree &
Diff

If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance; the circumstance in which alone the two sets of instances differ, is the effect, or cause, or a necessary part of the cause, of the phenomenon.

Mill's Methods

Agreement

Difference

Agree &
Diff

Residue

Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.

Mill's Methods

Agreement

Difference

Agree &
Diff

Residue

Concomitant
variations

Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.

Causal Terminology

- Unit: A physical object at a particular point in time
- Treatment: An intervention, whose effects we wish to assess relative to some other (non-)intervention
- Potential outcomes: The outcome for each unit that we would observe if that unit received each treatment
- Multiple potential outcomes for each unit, but we only observe one of them
- Causal effect: The comparisons between the unit-level potential outcomes under each intervention
- Average causal effect

Potential Outcomes

Causal inference is about estimating what would have happened in a counterfactual reality

Potential Outcomes

Causal inference is about estimating what would have happened in a counterfactual reality

Has anyone read or seen A Christmas Carol?

Fundamental problem of causal inference

But we can only observe any given unit in one reality!

Scientific solution

- Used in physical sciences (e.g., agriculture)
- Two strategies:
 - Take the same unit and expose it to both treatments at different points in time
 - Take two similar units and expose to the two treatments at the same
- Requires constant effect assumption:
 - The past does not matter
- Also requires homogeneity of units assumption
 - Units are identical (or differences are irrelevant)

Statistical solution

- Random assignment
- Observation of average causal effects

Causal inference in political science

Traditional observational research approach:

- The observation of one or more units.

Causal inference in political science

Traditional observational research approach:

- The observation of one or more units.

Experimental approach:

- Observation plus intervention

"Perfect Doctor"

True potential outcomes (unobservable in reality)

Unit	Y(0)	Y(1)
1	13	14
2	6	0
3	4	1
4	5	2
5	6	3
6	6	1
7	8	10
8	8	9
Mean	7	5

"Perfect Doctor"

How observational data can mislead

Unit	Y(0)	Y(1)
1	?	14
2	6	?
3	4	?
4	5	?
5	6	?
6	6	?
7	?	10
8	?	9
Mean	5.4	11

Definition of an experiment

- Minimum definition

The observation of one or more units after an intervention in a controlled setting.

- More complete definition

The observation of units after, and possibly before, a randomly assigned intervention in a controlled setting, which tests one or more precise causal expectations.

Elements an experiment

1. Physical intervention
2. Control
3. Treatment assignment independent of potential outcomes
4. Treatment assignment independent of all confounding variables

Outline for today

1. Introductions
2. Overview of course
3. Introduction to experiments
4. Preview of next week
5. In-class exercise

Next week: Readings

- Shadish, Cook, and Campbell on research design
- Chapter from Gerring (I will send this to you via email)
- A short article by me explaining what goes into an experimental protocol
 - Gives you a sense of details for the exam
- An example experiment by Druckman and Nelson

Next week: Assignment

Complete a summary of the experiment by Druckman and Nelson

Outline for today

1. Introductions
2. Overview of course
3. Introduction to experiments
4. Preview of next week
5. In-class exercise

In-class exercise

How do we read experimental literature?

- Research question
- Theory/hypotheses
- Variables
- Design
- Data collection/protocol
- Analysis
- Results/findings

Kahneman and Tversky

Try to summarize Kahneman and Tversky in this way

- Research question
- Theory/hypotheses
- Variables
- Design
- Data collection/protocol
- Analysis
- Results/findings