Research Design

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General Comments

- What is political science and what are different ways of doing it?
- Major components of research designs
- Designing research to ferret out *causal* relationships
- Social science *vs.* natural science/engineering

What is *political science?*

- Understand two words
  - Statistics
  - science

Statistics

- **1. a.** Construed as *sing.* In early use, that branch of political science dealing with the collection, classification, and discussion of facts (especially of a numerical kind) bearing on the condition of a state or community. In recent use, the department of study that has for its object the collection and arrangement of numerical facts or data, whether relating to human affairs or to natural phenomena. (OED)
- First usage: 1770

Etymology of *statistics*

- From German *Statistik*, political science, from New Latin *statisticus*, of state affairs, from Italian *statista*, person skilled in statecraft, from *stato*, state, from Old Italian, from Latin *status*, position, form of government.

-American Heritage Dictionary of the American Language

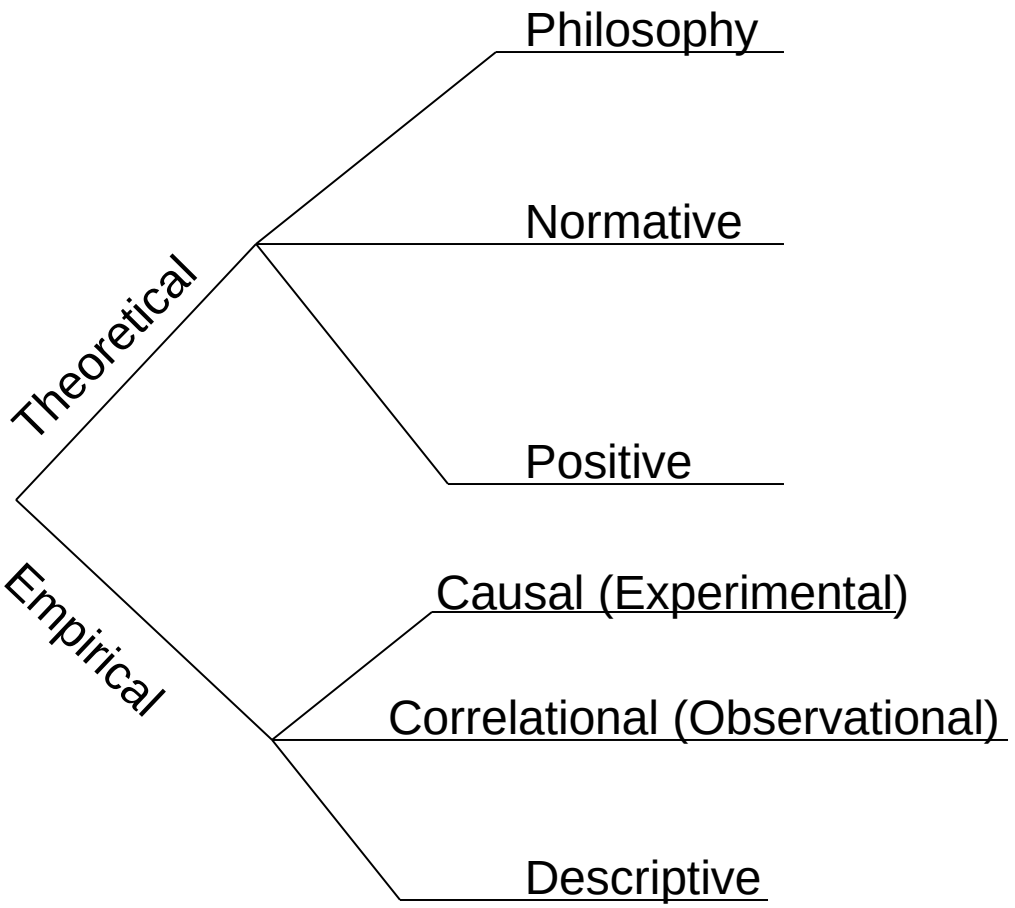
What is *science?*

"Science is a particular way of knowing about the world. In science, explanations are restricted to those that can be inferred from the confirmable data – the results obtained through observations and experiments that can be substantiated by other scientists. Anything that can be observed or measured is amenable to scientific investigation. Explanations that cannot be based upon empirical evidence are not part of science."

From National Academy of Sciences brief in Kitzmiller *et al vs.* Dover Area School District, *et al*

Therefore, *political science* is a profession that arose to improve human kind by (1) documenting the performance of states and (2) holding them accountable for their actions by careful measurement of the social world.

The Road Map


Philosophy
Normative
Theoretical
Positive
Causal (Experimental)
Empirical
Correlational (Observational)
Descriptive

Major Components of Research Designs

- Research question
- Theory
- Data

Research Question

- Important
  - Not too general
  - Not too specific
  - Just right
- Contribute to literature
  - How to tell: Social Sciences Citation Index
  - http://libraries.mit.edu/get/webofsci
  - E.g.: effect of redistricting on congressional election results
    - Search for Cox & Katz, “The Reapportionment Revolution and Bias in U.S. Congressional Elections,” *AJPS* 1999

Theory

- Definition: A general statement of a proposition that argues *why* events occur as they do and/or predicts future outcomes as a function of prior conditions
- General/concrete trade-off
- Desirable qualities of theories
  - Falsification (Karl Popper)
  - Parsimony (Occam's razor)

Data

- More on this later, but first some basic terms:
  - Cases
  - Observations
  - Variables
    - Dependent variables
    - Independent variables
    - Confounding (lurking) variables
  - Units of analysis [not mention in H&U]

Causality

- Definition of causality
- Problems in causal research
- Side trip to Campbell and Stanley

Definitions of Causality

- Logical
  - *A* causes *B* if the “presence” of *A* is a sufficient condition for *B*.

- Experimental
  - *A* causes *B* if *B* occurs following the “exogenous” introduction of *A*
  - When does exogeneity occur?
    - Classic experiments
      - Ansolabehere & Iyengar on negative campaign ads
    - “Natural” experiments
      - Voting machines in Georgia & Massachusetts
      - Village councils in India
      - Election observation in Ghana
  - When does it not occur?
    - Typical research in previous examples
    - Anything strategic (prices, deterrence, campaign spending)

The Biggest Problems in Causal Research

- Establishing the exogeneity of “causes” in observational/correlational studies
  - Selection into “treatment” and “control” cases rarely random
    - Medical examples
    - Schooling examples (private vs. public)
    - Freshman special programs example
- Jointly determined relationships
  - Prices/quantities in markets
  - Spending/(expected) votes in elections
  - Armaments/level of violence in international systems
  - Crime rates/enforcement activities

How to Establish Causality

- Donald Campbell and Julian Stanley, *Experimental and Quasi-Experimental Designs for Research* (1963)

Design types

- Pre-test/post-test with control group
- Solomon four-group design
- One-shot case study
- One-group pre-test/post-test
- Static group comparison
- Post-test only experiment

[Running examples: voting machine effects]

Pre-test/Post-test Control Group

- Summary:

$$R \quad O^1_T \quad X \quad O^2_T$$

$$R \quad O^1_C \qquad\qquad O^2_C$$

- Effect of treatment:

$[O^2_T – O^1_T] – [O^2_C – O^1_C]$

- This is the classic randomized experiment
- Problem: “Hawthorne effect”
  - Placebo helps mitigate

Solomon Four-Group Design

- Summary:

R	O	X	O
R	O		O
R		X	O
R			O

- Allows you to control for the effect of the experiment itself
- Never done, as far as I can tell

One-shot Case Study

- Summary:

  X O

  or

  O X
- Journalism
- Common sense
- “of no scientific value”



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Liquor law's role in postgame riots is hotly debated

The Boston Globe

By Mac Daniel, Globe Staff, 2/4/2004

Mayor Thomas M. Menino has blamed newly permitted Sunday liquor sales for helping to fuel post-Super Bowl riots in student areas, saying that young people were "able to run to the store when they ran out of beverage and stock up."

One-group Pre-test/Post-test

- Summary:

O X O

- "Historical control"
- Better than nothing
- Standard way of doing most research
- Big problems
  - No comparison group
  - No random assignment
    - Encourages "samples of convenience"

The manager of one popular liquor store, Huntington Wine & Spirits on Huntington Avenue near Northeastern, said his store closed early Sunday to avoid a drunken rush.

Sunday's riots "were a terrible thing, and they shouldn't have happened," said manager Steven Rubin, whose store has refused to sell beer kegs for 10 years, despite the store's proximity to major college markets.

When asked if he thought Sunday liquor sales contributed to the riots, Rubin said no.

"Absolutely not," he added, "and I say that only because of what happened two years ago. Two years ago liquor stores weren't open, and we had the same problem."

Static group comparison

- Summary:

$$X \quad O^2_T$$

$$O^2_C$$

- This is most cross-sectional & correlational analysis
- E.g., “gay marriage hurt Kerry”
- Problems
  - Selection into the two groups
  - No pre-“treatment” measurement

Post-test only experiment

- Summary:

R X O

R O

- No prior observation (assume $O^1_T = O^1_C$)
- Classical scientific and agricultural experimentalism

Where do standard political science studies fall among the Stanley/Campbell designs?

- One-shot case study
  - Little scientific value, but may be descriptively useful, or a useful foil
- One-group pre-test/post-test
  - Often used in policy analysis
  - Only justified as a “best design” if there are ethical or other constraints
- Static group comparison
  - Correlational studies by far the most common “scientific” social science research
- Pre-test/post-test with control group
  - “Real” experiments uncommon, but growing in frequency
  - “Quasi-experiments” growing more rapidly
- Solomon four-group design
  - Don’t recall ever seeing this
- Post-test only experiment
  - Leads to weaker statistical tests

What are the Implications for My Research?

- Classical experimentation unlikely, but always preferred (never had one)
- Strive for “natural” or quasi-experiments
  - Alternating years of standardized testing
  - Ruling death penalty unconstitutional
  - Imposition of new voting machines
  - 9/11 terrorist attacks
  - “surprise” election results (e.g., Hamas victory)
- Gather as much cross-time data as possible (panel studies)
- If you have a pure cross-section, be humble