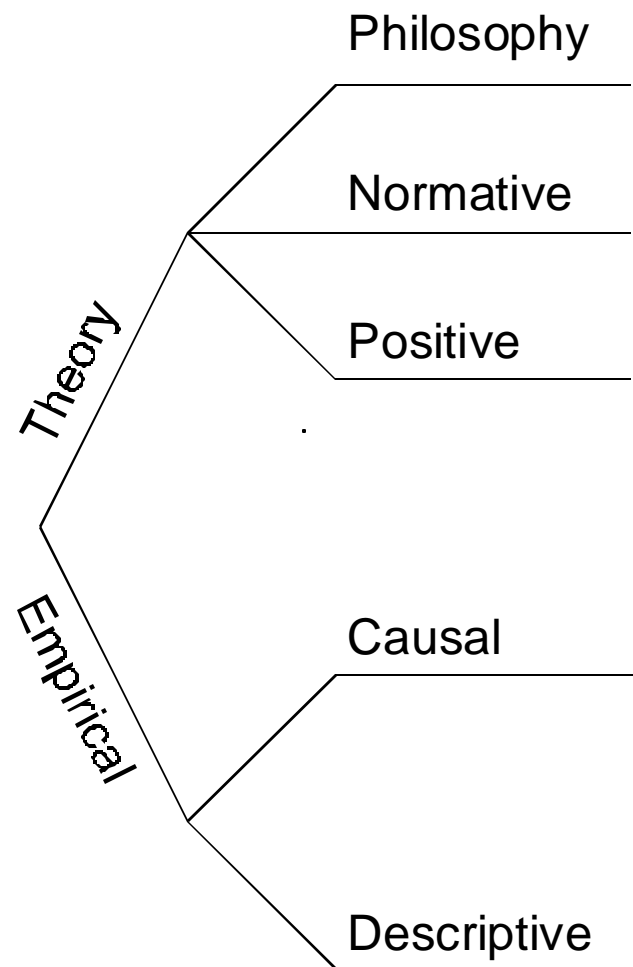


Research Design & Variable Measurement

- Different ways of doing p.s. research
- Basic laws for doing research
- Social science *vs.* Natural science/engineering
- Components of research design
 - Side trip to data
- Causality
 - Side trip to types of research designs
- Seven things to avoid

The Road Map



Different Ways of Doing Empirical Research

- Interpretive
 - *Verstehen*
- Small- N case study
 - Haphazard
 - Structured
- Large- N statistical analysis
- Interactions among these ways

Basic Laws of Doing Empirical Social Science Research I

- No clear path between interesting & researchable questions
- Path paved with observable implications
- Any research work doing contributes to a body of knowledge
- Most of the low-hanging fruit has been picked

Basic Laws of Doing Empirical Social Science Research II

- But there are other orchards
- Never under-estimate the ease of replication
- Build upon scalable ambitions

Social Vs. Natural Science & Engineering

- Reductionism
- Degree of reductionism
- Implications
 - Measures of association weak
 - Aggregates often better predictors
- Why we have statistics
 - Probabilities
 - Expected values

Major Components of Research Design

- Research question
- Theory
- Data

Research Question

- Importance
 - Not too general
 - Not too specific
 - Just right
- Contribute to literature
 - www.webofscience.com

Theory

- Def: A general statement of a proposition that argues *why* events occur as they do and/or predicts future outcomes as a f(prior conditions).
- General/concrete trade-off
- Observable implications
- Falsification
 - Karl popper
- Parsimony
 - Occam's razor

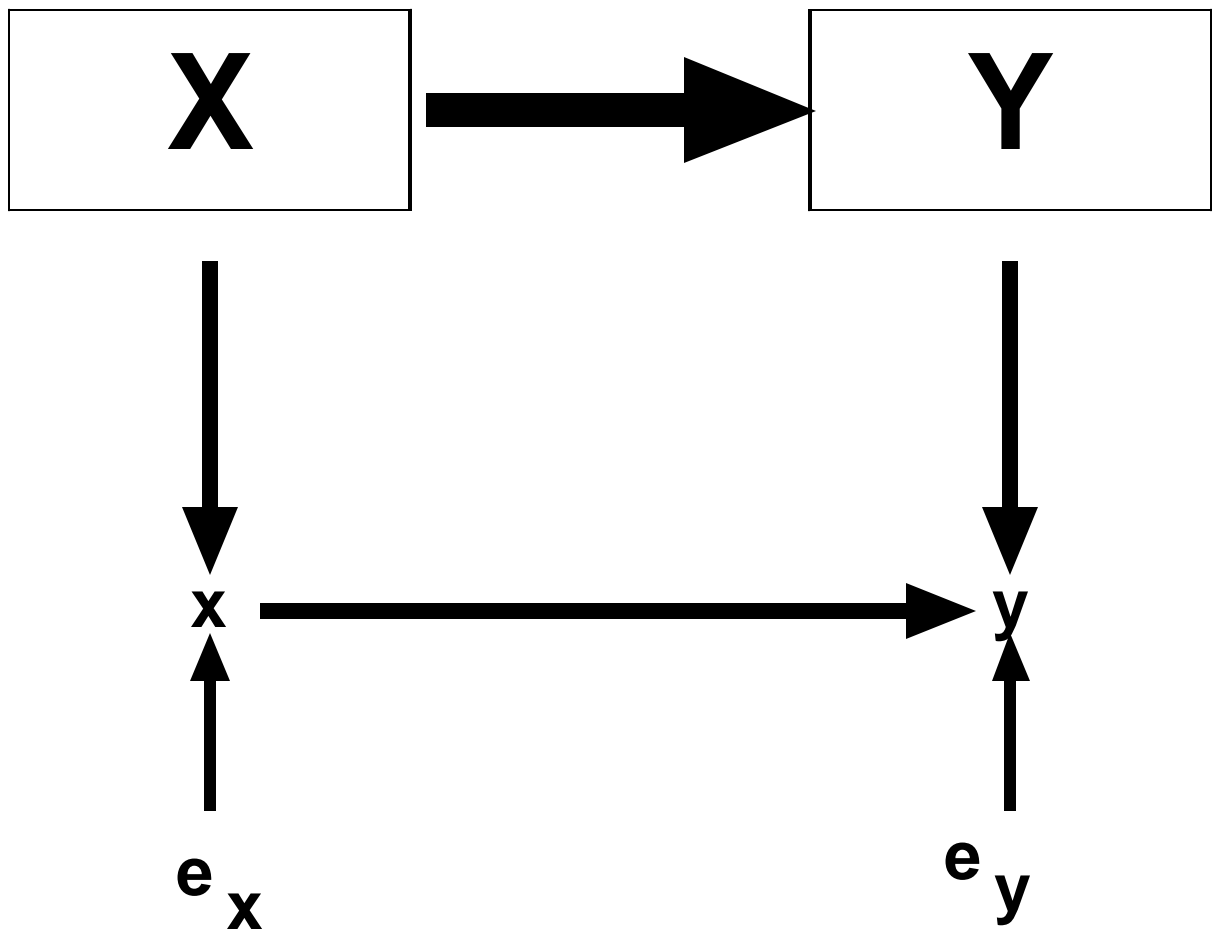
Data

- Terms
 - Cases
 - Observations
 - Variables
 - Units of analysis
- Mapping between the abstract and concrete
 - Measures
 - Indicators

Side Trip to Measurement

- From abstraction to measure
- Sources of error
- What to do about error

The Mapping



Mapping from Abstraction to Measure

- Very abstract
 - Alienation and suicide
 - Moral decay and crime
- Less abstract
 - Democracy and peace
 - Party identification and voting
 - Fear of defeat and fundraising
 - Polarization and responsiveness

Sources of Error

- Conceptual or design error
- Bad breaks in random sampling
- Survey question wording
- Non-random out-selection
- Transcription errors
- Calculation & mechanization errors

What to Do About Error

- Practice safe data
 - Know where your data come from
 - Watch for anomalies
 - Use multiple measurement techniques
 - Collect as much data as possible and disaggregate

Causality

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

Definitions of Causality

- Mechanical
- Logical
- Statistical
 - Experimental paradigm
 - Expected values

Problems in Causal Research

- Theory
 - Confounding effects
- Design
 - Experimentalism is an ideal
 - Observationalism
 - “natural experiments”
 - Control variables

Donald Campbell and Julian Stanley

*Experimental and Quasi-
Experimental Designs for
Research (1963)*

Research design types

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

One-shot Case Study

- Summary:

X O

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

One-group Pre-test/post-test

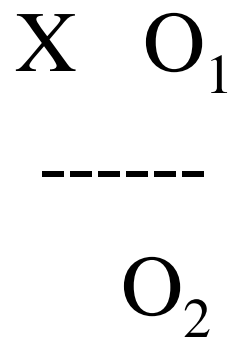
- Summary:

O X O

- Better than nothing
- Standard way of doing most research

Static group comparison

- Summary:



- Problems
 - Selection
 - Mutual causation
- This is most cross-sectional analysis

Pre-test/Post-test Control Group

- Summary:

$$\begin{array}{cccc} \text{R} & \text{O}^1_{\text{T}} & \text{X} & \text{O}^2_{\text{T}} \\ \hline \text{R} & \text{O}^1_{\text{C}} & & \text{O}^2_{\text{C}} \end{array}$$

- Effect of treatment:

$$[\text{O}^2_{\text{T}} - \text{O}^1_{\text{T}}] - [\text{O}^2_{\text{C}} - \text{O}^1_{\text{C}}]$$

Solomon Four-Group Design

- Summary:

R O X O

R O O

R X O

R O

- This allow you to control for the effect of the experiment itself

Post-test only experiment

- Summary:

R	X	O
R		O

- No selection
- No prior observation
- Classical scientific and agricultural experimentalism

Last word: Things to Avoid

- Colinearity
- Sampling on the dependent variable
- Constant explanatory variables
- Constant dependent variables
- Measurement error
- Excluded variable bias
- Endogeneity