POLS201 Spring 2019

Threats to Validity

Ian McDonald

January 30

Before we begin

- On Friday, We will walk through Lab 1 together
  - Bring your laptop.
- Before Monday:
  - Complete the pass/fail quiz in Moodle
  - Submit a research question in Moodle
    - Upload a file named "[lastname] RQ""
- Questions?

Summary of K&W Chapter 3 and Some Extra Vocab

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- Using the four question checklist
- A couple of terms they don't mention
- Very basic intro to experiments

One Final Note about Pearl

- Think of causation as a credible causal mechanism.
- A *process* lurking beneath the surface that
- Sometimes produces an observable result
- Sometimes increases the likelihood of an observable result
- We use the term **external validity** (credibility)

Kellstedt and Whitten Offer Four Guidelines

- Satisfy four conditions and you have a good case.

1. Do you have a credible causal mechanism?
2. Do we know that your DV doesn't cause your IV?
3. Do your IV and DV covary as you would expect?
4. Do you avoid cofounding variables?

Some Modeling Terminology

- We use X to describe independent variable(s)
- We use Y to describe dependent variable
- So expect that X causes Y
- We use Z to describe additional or confounding variables

Test 1: Credible Causal Mechanism

- The "sniff" test suggested by Pearl.
- You will see: statistics only suggest possible causation...
- ...but **never** prove it.
- Your causal story is your best and only hope.

Test 1: Credible Causal Mechanism

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- Which seem plausible to you?
- All of these examples are statistically positive
- Economic performance ====> Incumbent Vote
- Outisde temperature ====> Crime Rate
- Hair color ========> Partisanship
- Ice cream sales =======> Crime Rate

Test 1: Credible Causal Mechanism

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- Ice cream sales ===> Crime Rate? Inconfefeable!!!
- But maybe...

This little piggy has high blood sugar

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- Delicious ice cream raises blood sugar
- Elevated blood sugar induces criminal behavior
- This piggy held up a 7-11 shortly after eating his cone

Perhaps Blood Sugar is an Intervening Variable

- Ice cream ==> Blood sugar ===> Crime
- An intervening variable sits between X and Y

Test 2: Does Y actually cause X?

- Do you have the causal sequence right?
- Does partisanship cause ideology or vice versa?
  - Both stories are plausible.

Test 2: Does Y actually cause X?

- A helpful way to check? Are they temporal?
  - World War II ===> World War I? Unlikely.
  - But it's a bigger problem that you might guess.
- Does school achievement *cause* Head Start?
  - Maybe, depending on the process that locates Head Start resources?
  - Doesn't destroy your theory, but it's a warning.

Test 3: Do X and Y covary?

- Do X and Y move together in a plausible way?
- If they don't you haven't disproven your theory
- But if they don't covary plausibly, you have 'splaining to do.

Test 3: Covariance is a statistic

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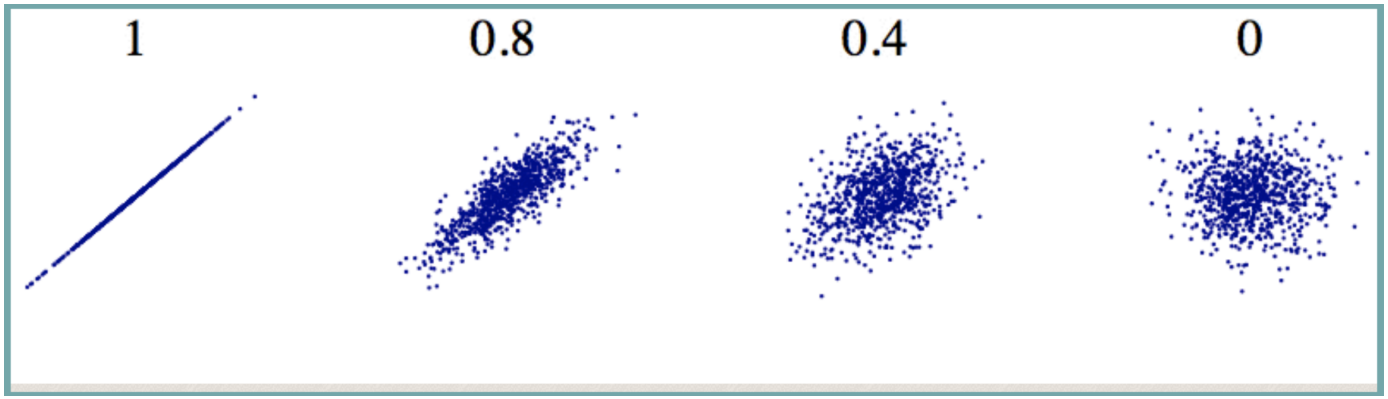

- These are positive/neutral but can be negative

Test 4: Have you avoided confounders?

- Confounders have two properties:
  - Unlike an intervening variable, they precede your IV (temporally or logically).
  - They covary with your IV as well as the DV.
- Confounders may seem impossible to avoid but there is one well used remedy:
  - Experiments and experimental design.

Test 4: Have you avoided confounders?

- Does ice cream cause more crime?
  - Summertime ==> Ice Cream and
  - Summertime ==> Higher Crime
  - All three of these things covary
- An experiment would clarify things.

Test 4: Basic experiments

- If ice cream causes crime, it shouldn't matter when it's sold
- So let's see how much crime we get with more ice cream, regardless of when it's sold
  - We will randomly assign ice cream sales to every season and temperature and see if the relationship holds
  - And guess what. . . it probably won't.

Test 4: Basic experiments

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- So the point of an experiment: Change the one thing we care about while keeping every other consideration "constant"
- Randomly assign a sufficient number of observations into an "experiment" condition and a "control".
- The challenge, as you will see: Random assignment is fraught with risks of introducing hidden confounders.

Last but Not Least: Unit of Analysis

- The lowest level of detail that describes what you're counting or observing. Examples:
  - Individual survey respondents
  - Legislators
  - Countries
  - Documents
  - Elections
  - Tweets
  - ..and so on.

Let's Read Three Abstracts from 1/19 Journal of Politics

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