POLS2044 WEEK 3
Research Design

Australian National University
School of Politics & International Relations
Dr. Richard Frank
richard.frank@anu.edu.au

Last week (Week 2) we focused on developing theories about political outcomes that have a clear causal inference approach. We discussed ten ways of coming up with interesting research ideas and four hurdles to developing causal theories.

This week (Week 3) we will read and discuss ways of turning our ideas and causal theories into tangible research designs.

My goals for Week 3:

1. Discuss myriad ways that experimental and observational methods help us answer the sorts of theoretical questions we discussed in Week 2.
2. Reaffirm your knowledge of important terms in this class (e.g., independent variables, dependent variables, causality, hypothesis, endogeneity, spuriousness).
3. Answer any questions about the midterm exam.
4. Answer any remaining questions you might have about the class substance or structure.

The first week of workshops appears to have gotten off to a good start. Sajjad and I are getting a better idea of who you are, what areas of research interest you, and what questions you have about the readings, lectures, and tutorial activities.

I. Reading notes and questions

The assigned reading this week is chapters 4 (pp. 77-100) of the Kellstedt and Whitten (2018) textbook.

Several topics and questions that are worth paying specific attention to are:

- Why is comparison crucial to establishing causal relationships?
- Why are experimental research designs so powerful in establishing causality?
- How can we connect our discussion of the four causal hurdles to experimental and observational research designs?
- What are the potential drawbacks to these research designs?
- Can you think of a research design to evaluate your research question and causal theory you discussed in last week's lecture?

LECTURE INTRODUCTION

Today's motivating questions

What common types of "political science research design" are there?

What are their strengths and weaknesses?

How can you apply them to empirically evaluating the implications of your causal theory?

Motivating puzzle

Why does (almost) no-one like talking about both the strengths and weaknesses of political methods?

Even the *Oxford Handbook of Political Science* puts political methodology last.

My questions to you

What are the goals of political science research?

What should they be?

LECTURE PART 1: Weeks 1 & 2 recap

Weeks 1 & 2 recap

What are the elements of the scientific method?

The focus is on the method not the outcome.

How can we develop causal theories about the world?

How can we increase our confidence that we have developed a solid, novel, interesting argument?

Ways to develop promising causal theories

1. Offer an answer to an interesting, important research question.
2. Solve an interesting puzzle.
3. Identify interesting variation (across time or space)
4. Move from a specific event to more general theories
5. Drop the proper nouns
6. Use a new Y
7. Use a new X
8. Add a new Z
9. Use the literature and contribute to it.

10. Make sure the theory can be disproven.

Four hurdles to establishing causality

When we think about causal arguments (our own or others), it is important to evaluate them according to the following hurdles:

1. Is there a credible mechanism connecting X and Y?
2. Can we rule out Y causing X (endogeneity)?
3. Is there covariation between X and Y?
4. Have we controlled for potential spuriousness (Z)?

Why should we care?

"Since politics uses the rest of the sciences, and…it legislates as to what we are to do and what we are to abstain from, the end of this science must include those of the others, so that this end must be the good for man [or, even finder and more godlike] for a nation or for city-states..[P]political science aims at …the highest of all goods achievable by action."

Aristotle, Nichomachean Ethics, 1094a & b (quoted in Alker, Hayward R. 2011. "Political Methodology, Old and New." In *A New Handbook of Political Science*: 787). Emphasis added.

LECTURE PART 2: Political science methods

Chris Achen (1983) as described in Alker (1994: 788)

Developing political science methods is like going through other disciplines' attics or garage sales.

What are political science methods?

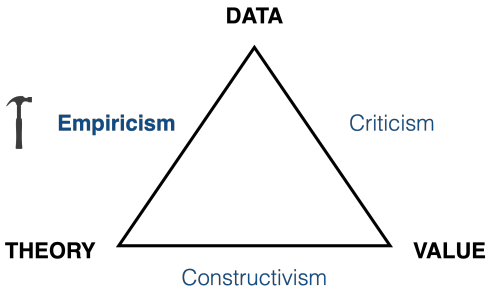
Political science methodology provides tools for answering questions about how and why the world works the way it does.

This involves the analysis of descriptive indicators for causal inference.

The goal is not normative judgement of what is "good" or "bad" or how the world should operate.

There is often a U-shaped relationship between the number of cases and the number of published studies. (Ragin et al. 1994)

Galtung's (1977) concept of science as described in Alker (1994: 797)



The rise of behavioralism

A graph of mentions of behavioral terms in the APSR

Source: Brady, Henry E., David Collier, and Janet M. Box-Steffensmeier. 2011. "Overview of Political Methodology: Post-Behavioral Movements and Trends." In the *Oxford Handbook of Political Science: 1006*.

The growth in causal thinking

More graphs from the above source

The growth of causal challenges

Final graph from the above source

Causal challenges

Screenshot of Baker, Monya. 2016. "Is There a Reproducibility Crisis?" *Nature* 533: 452.

Robert J. Hanlon's razor

"Never attribute to malice that which is adequately explained by incompetence."

Quoted in Reinhart, Alex. 2018. *Statistics Done Wrong: The Woefully Complete Guide*. San Francisco: No Starch Press: 4.

Research design trade-offs

		Dependent variable variation	
		Yes	***No***
Explanatory variable variation	***Yes***	**A** Quant. design (ideally)	**B** Selecting on DV
	No	**C** Shotgun approach	**D** A case study

LECTURE PART 3: Research design

Research design

- All about comparison
- Divide between experimental and observational studies
- Share goal to evaluate causal theories.
- Why is causation so important?

An experiment is not a focus group

Experimental research design

> **Definition**: "An experiment is a research design in which the researcher both controls and randomly assigns values of the independent variable to the participants."
> -Kellstedt & Whitten (2018: 80)

Control group vs. treatment group

> Groups are separated by a random factor like a coin flip.

The essential randomness of Cloudflare's lava lamps

Experimental design and causal hurdles

> A credible causal mechanism still depends on the theory.
>
> No worries about reverse causality because assignment of X happens before measure of Y. Random selection makes it impossible for anything else to cause X including Y.
>
> Sufficient variation is for us to determine whether in this or observational studies.
>
> We do not have to worry about spuriousness or confounding variables because random assignment prevents any systematic confounding variables.

Random assignment vs. random sampling

> Random assignment uses samples of convenience.
>
> Random sampling chooses a random number of units from the population.
>
> The only thing they really have in common is the "random."

Types of experiments

> Laboratory experiments
>
> Survey experiments

Field experiments

Natural experiments

Mechanical Turk survey example

Strengths and weaknesses of this approach?

Experiments' potential drawbacks

Not all variables are subject to manipulation.

Possible challenges of external validity

Replication challenges

Ethical dilemmas (e.g., Milgram's experiment)

Difficult to establish substantive importance compared to other potential explanations

Observational studies

Definition: a research design in which the researcher does not have control over values of the independent variable, which occurs naturally." Kelstedt & Whitten (2018: 93)

Three types: cross-sectional, time-series, and hybrid

These are not experiments.

We take reality as it is and "observe" it.

DATA are…maybe

Singular: a datum is
Plural: data are

Cross-sectional data

Time-series data

LECTURE PART 4: Reading research designs

Useful to ask a consistent series of questions

1. What is the research question or puzzle?
2. What is the main theory(ies) or argument(s)?
3. What type of research design is used?
4. How well does the work surpass the four hurdles?

Readings' important terms

Experimental research design
Observational research design
Treatment group
Control group
Placebo
Survey experiment
Field experiment
Natural experiment
Internal validity
External validity
Convenience sample
Replication
Datum and data
Cross-sectional data
Time-series data

III. WEEK 3 WORKSHOP

The focus of today's workshop (as most weeks are) is on applying the readings and lecture material to your own research. I enjoyed reading your responses to last week's questions, and we gave comments when judged potentially useful under "submission responses." If you have any questions about our feedback or cannot find it, do let me know. Also note that students overall workshop marks (0-3) for work submitted in items 1-2. I will do this for all workshop weeks, so we are all on the same page for your workshop activities. For your submissions, please (1) put full names (or U numbers) of students instead of just first names (we have more than one Nick) and (2) do not link to an online shared document or upload a document. There are too many potential security issues with links and it is often too hard to find your contribution when you just add it to this document and upload the wholte thing. Please just cut and paste from any shared document into your responses to Wattle. Finally, be sure to submit your responses. We graded several draft submissions last week, but we will not do so in the future as we cannot be sure that you are not planning to go back and add to your answers later.

Item 1: Individual work (~10 minutes)

Choose one of the terms we discussed in lecture and the reading so far. If none come to mind, look at the list on page 7 above.

Now spend a sentence or two writing down your version of the definition. If it comes out like (or identical) to one that you found in the readings or lecture that is fine. What is important is that you chose one term to look at in more detail.

> Why did you choose this term?
>
> Do you think it is useful to understand this term when reading or conducting political science? Why?
>
> Can you think of an example of this term?

Submit your individual response to Week 3/Workshop/Item 3.1.

Item 2: Small group work #1 (~20 minutes)

Each student in your group should now describe their term, a brief justification, and an example to the rest of your group.

For this item, write down (as a group) what terms were used by your group as well as answers to the following questions.

> What are the most confusing elements of these terms?
>
> Have you read academic articles that use these terms?
>
> What other research design approaches use or compete with this term/approach? What are their strengths and weaknesses?

To what extent might they be useful in empirically evaluating your research question/argument from last week?

Nominate one member of your group to submit the group response to Week 3/Workshop/Item 3.2.

Item 3: Small group work #2 (the remaining class time)

The previous two items are an opportunity to think theoretically about different research designs and appreciate their strengths. Now let us turn to seeing how people use these approaches (and terms) in the wild.

For this item, please look at the list of policy briefs from the Evidence in Governance and Policy (EGAP) project (https://egap.org/policy-briefs/). This project is at the forefront of rigorous experimental designs of policies and analysis in myriad countries around the world. We focus on experimental designs here as we will have most of the rest of the semester to focus on observational designs. EGAP policy briefs succinctly outline existing projects around the world in a simple and concise manner.

For this item, write down (as a group) answers to the following questions.

Which brief did you choose? Write down the brief number. If there is no number write down the brief title.

What is the research question or puzzle?

What is the main causal theory(ies) or argument(s)?

What type of research design is used? Experimental or observational?

What additional information about the research design did you find interesting?

What are the main results? If there are null results, how do the researcher(s) explain them?

How well do you think this work surpass the four hurdles?

Nominate one member of your group to submit the group response to Week 3/Workshop/Item 3.3.