

The MIDA framework


POLSCI 4SS3

Winter 2024


Announcements

- I received accommodation letters. Schedule a meeting if you need anything beyond extra time for completing assignments
- Labs now due at 11:59 PM instead of 5 PM (haven't updated syllabus yet)
- Submit lab 1! It's easy and I won't penalize you if you are late this time

Last week


- Overview of course topic, goals, evaluation, expectations
- We installed R and RStudio and explored them a bit
- Cloud option always available if all else fails
- More details in the [course website](#) 

Today

- Talk about what research design means in the context of this course
- Overview of the MIDA research design workflow
- **Takeaway:** Research design as a set of steps that can be *encoded and interrogated*
-  **Lab:** Intro to R

Research Design


What is a research design?

-  RD: A procedure for generating answers to questions
- **More generally:** Thinking about how research is (*was, will be*) conducted
- **Emphasis:** We can **program** and **interrogate** elements of a research design

Elements of research design

1. Model (M)
2. Inquiry (I)
3. Data strategy (D)
4. Answer strategy (A)


Model

- : A set of speculations about what causes what and how
- **Set:** We consider many models because we are uncertain of how the world works
- **Speculation:** All models are wrong, some models are useful
- **What causes what:** Informs the *event generating process* (e.g. variables, distributions, correlations)
- **How:** An explanation of why things are connected or correlated

Examples of models?

Hint: Models are also called theories (of change), arguments, claims, beliefs, epistemologies, ideologies, hunches, conjectures

Inquiry

- : A research question stated in terms of the model
- In this course, we will talk about **quantities of interest** or **estimands**
- **Estimands, estimators, and estimates** are different things with annoyingly similar names!
- Some questions will lend themselves to multiple inquiries. We will tend to focus on those with one or a handful

Examples of inquiries

1. What is the proportion of unemployed people in the country?
2. What is the effect of immigration on economic development?
3. Do people support funding private clinics to mitigate surgery backlogs?
4. Will the stock market crash this year?
5. Individual causal effect $\tau_i = Y_i(1) - Y_i(0)$

A note on notation

Greek

- Letters like μ denote **estimands**
- A hat $\hat{\mu}$ denotes **estimators**


Latin

- Letters like X denote **actual variables** in our data
- A bar \bar{X} denotes an **estimate** calculated from our data

$$X \rightarrow \bar{X} \rightarrow \hat{\mu} \xrightarrow{\text{hopefully!}} \mu$$

$$\text{Data} \rightarrow \text{Estimate} \rightarrow \text{Estimator} \xrightarrow{\text{hopefully!}} \text{Estimand}$$


Data strategy

- : Set of **procedures** used to **gather information** from the world
- Three features:
 1. How *units* are selected
 2. How *conditions* are assigned
 3. How *outcomes* are measured

Elements of data strategies

- **Sampling:** Random, stratified, snowball
- **Assignment:** Two-arm, multi-arm, factorial
- **Measurement:** Number of measures, time periods, data-adaptive

Answer strategy

- : How we summarize the data produced by the data strategy
- Data *is too complicated* to speak for itself
- Needs summary and explanation
- Most **research methods** qualify as **answer strategies**

Types of answer strategies

1. **Point estimation:** Single value answer
2. **Hypothesis test:** Yes/no answer based on (statistical) procedure
3. **Bayesian:** How likely different answers are given prior beliefs and data
4. **Interval estimation:** Identify a range of plausible answers

Types of answer strategies

1. **Point estimation:** Single value answer
2. **Hypothesis test:** Yes/no answer based on (statistical) procedure
3. ~~**Bayesian:** How likely different answers are given prior beliefs and data~~
4. ~~**Interval estimation:** Identify a range of plausible answers~~
 - They all include procedures to quantify **uncertainty**

Parallels

MIDA research designs have an **theoretical** and an **empirical** part:

Theory	Empirics
Model	Data strategy
Inquiry	Answer strategy

Next Week

Representative Surveys

Focus on: What makes a *good* survey?


Break time!





Lab

Tip before you start

- Last week, we created a project folder/directory for the class
- Save all lab `.qmd` files in the same directory
-  will automatically recognize all files within the project directory
- Continue using the same project for all lab assignments

