

# **A “Short” Introduction to Experimental and Quasi-Experimental Designs**

**EDP 612 Week 5**

**Dr. Abhik Roy**

# A Typical List of Variable Types

There are just so many!

You may need to memorize these in the future but for now, this is a not very comprehensive list

Mostly jargon free because communication is more important than sounding smart

Popular falesly attributed quotes but still apply:

- *You do not really understand something unless you can explain it to your grandmother*
- *If you can't explain it simply, you don't understand it well enough*
- *Explain it to me like I'm an idiot*

# The Basic Comparisons



Independent  
the cause

Dependent  
the effect

Explanatory  
what is changed

Response  
what happens from that change

Mediator  
something that can somewhat or fully explain cause and effect

Moderator  
something that impacts the direction and/or strength between  
cause and effect

# The Basic Ones Without Good Comparisons



Extraneous

something known but not being studied that could influence cause and effect

Confounding

something not known that could influence cause and effect

Control

a baseline that doesn't change

# Part I: Nonexperimental Research



- Lacks the manipulation of an independent variable
- While we cannot show causation, this type of research is still very important

# When Should We Use Non-Experimental Research?

- You only have a single variable
- You have a non-causal relationship between variables
- There is a causal relationship, but you can't (practically or ethically) randomly assign participants
- There's a broad or exploratory question that needs answered
- Need to make sense of data
- *Examples*

*Does damage to a person's hippocampus impair the formation of long-term memory traces?*

*Is there some relationship between verbal intelligence and mathematical intelligence?*

*How accurate are people's first impressions?*

*What is it like to be a working mother diagnosed with depression?*

# Types: Correlational Research



# What is Correlational Research?

- Non-experimental research design used to assess the statistical relationship between two variables
- Little to no effort is used to account for confounding variables





# Why Do Correlation Research?

- If there's no correlation, then there can't be eventual causation
- Ideas for future experiments
- Some studies are too impractical or unethical to be done using an experiment



# Goals for Correlation

## 1. *Descriptive.*

- Describes relationships
- *Example.* “Does bragging about wealth correlate with scores on the Narcissistic Personality Inventory?”

## 2. *Predictive.*

- Predict behavior
- *Example.* “If a rich person scores 34 (greater level of narcissism) on the Narcissistic Personality Inventory (predictor variable), can we can predict that individual is more likely to brag about wealth (outcome variable)?”

# Maybe / Could Be vs Probably / Certainly



## Correlational

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Cannot determine cause

Cannot control variables

Observe and describe possible relationships

Find individual differences

## Experimental

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Causal

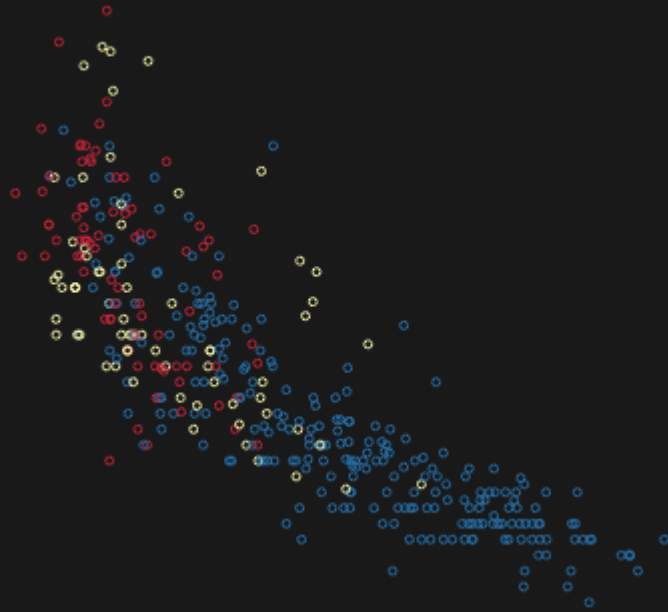
Experimental control

Manipulate and describe changes

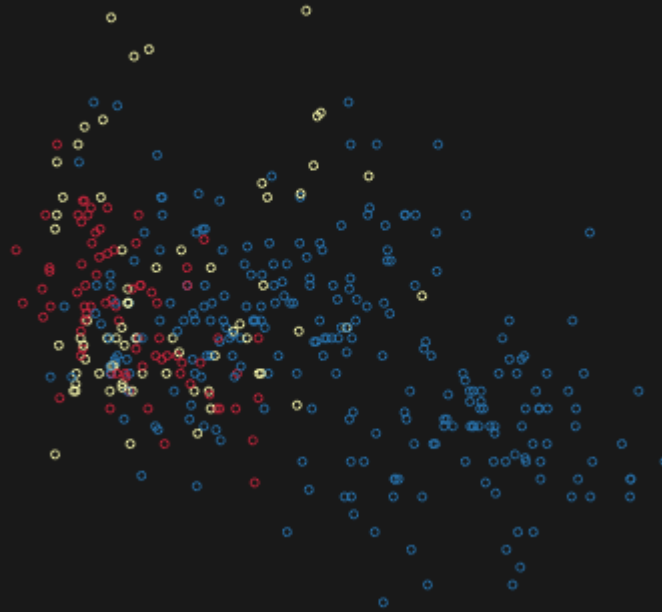
Find group differences

# Sometimes Making Sense Out a Mess

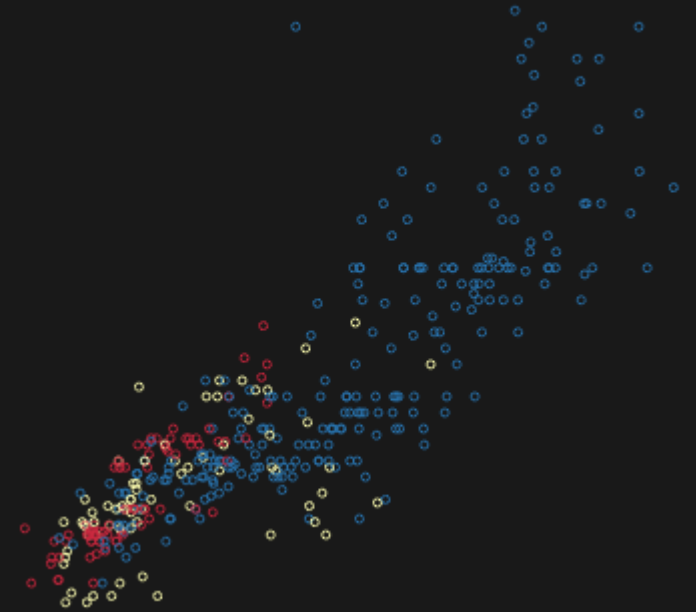
Negative Correlation



Weak or No Correlation



Positive Correlation



# Calendar of Tasks



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L0	L0: Lit Review Process	Week 3
L1	L1: Topic Selection & Annotated Bib	Week 5
L2	L2: Annotated Bibliography	Week 7
L3	L3: Lit Review First Draft	Week 9
L4	L4: Lit Review Second Draft	Week 11
L5	L5: Lit Review Third Draft	Week 13
L6	L6: Lit Review Final Version!	Week 15 <sup>1</sup>

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<sup>1</sup>This is the week of final exams.

# Part II: Experimental Design



# Two Features of an Experiment

- Manipulation of the Independent Variable
  - Can “cause” this independent variable to occur
  - This “cause” elicits the response (dependent variable)
  - Random Sampling
  - Control of Extraneous Variables
  - Can hold variable(s) constant
  - Limit variable to a specific category
  - (Random Assignment)

*Quasi Experiment* - Can typically manipulate the IV, but cannot randomly assign participants to conditions

# Types of Treatment & Control Groups

- Randomized clinical trial
  - One group gets the “treatment” and another group doesn’t –the control
  - No-treatment control condition
  - Zero Treatment (they get nothing)
  - Problem: placebo effect
  - Placebo Control group
  - Given Placebo
  - Checks for placebo effect
  - Wait-list control condition
  - Delayed treatment
  - Checks for “expectation of improving”



# Random vs. Random



## Random Sampling

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Cannot determine cause

Cannot control variables

Observe and describe possible relationships

Find individual differences

## Random Assignment

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Causal

Experimental control

Manipulate and describe changes

Find group differences

# Types of Designs

- Between Subjects Experiments
  - Each participant tested only once
  - Relies on random assignment
  - Matched group design
- Simultaneous Within Subject Design
  - Mixed trials/conditions

- Within subject Experiments
  - Each participant tested in all conditions (Blocked)
    - Order Effects
    - Carryover Effects
    - Practice Effects
    - Fatigue effect
    - Context effects
  - Counterbalancing
    - Repeated

# Which One is Better?

## Between Subject

- Conceptually simple
  - Less testing time for an individual
  - Avoids carryover effects and no need for counterbalancing
  - \*Best when you only get one shot

## Within Subject

- Controls for extraneous participant variables (lowered noise)
  - Fewer subjects
  - Less testing time overall
  - \*Best option if the participant has time and don't think carryover is an issue

# Design an experiment

1. Go to Open Psychometrics
2. Take one of the assessments with your partner
3. Design an experimental study
  - What are you testing?
  - Who are you testing?
  - What are you testing for?
  - What are you measuring?
  - What do you expect to happen?

Be prepared to talk about them in about 30 minutes.

# That's it!

Any questions?

