

Lecture 4  
Research methods

1

---

---

---

---

---

---

---

---

Correlational research

- Looking for the relationship between variables
- Often less control than experimental designs, though often possible when experiment impossible
- No implication of causality!
  - Possibility of third factors

2

---

---

---

---

---

---

---

---

On your own

- Make sure you look at how scatterplots display correlational data (textbook)

3

---

---

---

---

---

---

---

---

## Experimental designs

- Does my training program work?
- Does this medication help?
- Random assignment to groups and control of other variables allows inference of causality

4

4

---

---

---

---

---

---

---

---

## Key Concepts in an Experiment

1. Independent variable (IV): The variable that is manipulated.
2. Dependent variable (DV): The variable that is measured.
3. Experimental group: The group of participants that receive the treatment component of the manipulated variable.
4. Control group: The group of participants that is the same as the experimental group in every way except that they don't receive treatment component of the manipulated variable.

5

5

---

---

---

---

---

---

---

---

## Experiment example

Hypothesis:  
Listening to music while studying improves students' test performance.

- Experimental Group**
- Study list of 20 words for 2 minutes
  - Wear headphones to study
  - Listen to **music**
  - After 5 min, report words from list

- Control Group**
- Study list of 20 words for 2 minutes
  - Wear headphones to study
  - Listen to **white noise**
  - After 5 min, report words from list

6

6

---

---

---

---

---

---

---

---

### Key Concepts in an Experiment

- Everything about the groups is identical except the treatment (IV)
- Any differences on the DV must be due to the difference in treatment
- Test whether changes to the IV **cause** differences in the DV

7

*time, environment, words lists*

*equal division of gender,*

*"white noise" should consistant,*

*age*

7

### How similar should our groups be?

What variables do you think are crucial to control?

8

8

### Ensuring similar groups

- Random assignment
- Matching
- Sham control
  - usually in medical procedure*
  - animal study*
  - ↳ identical subjects*

9

9

*Quasi - experiment : No Random assignment with some other criterion to assign groups.*

## What happens if the two groups are not exactly alike?

**Extraneous Variable:**

Any variable other than the independent variable that can have an effect on the dependent variable.

**Internal validity:**

How certain we are that changes in the IV cause changes in the DV.

10

---

---

---

---

---

---

---

---

10

## Experimental Research

**Pros**

- Can establish causal relationship between variables

**Cons**

- Artificial
- Not always ethical

11

---

---

---

---

---

---

---

---

11

## Basic vs. applied research

- Basic research is done for the sake of knowledge
- Applied research is done for the sake of helping people
- Basic research typically less funded
- Applied research often builds on basic research
  - e.g., Dr. Phil Gander: tinnitus
- Basic research can also lead to theories that have applications for applied research

12

---

---

---

---

---

---

---

---

12

### On your own

- Read Describing Data (textbook) and make sure you understand these concepts

13

---

---

---

---

---

---

---

---