



# Analysis of Psychological Data

## Lab 1. Stepping into the World of Statistics: Design, Measurement, and Analysis

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Quantitative Methods, Measurement, and Statistics

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# Who am I?

## Background/Interests in

- Methodology and Statistics
- Psychology
- Bayesian inference



## Trivia

- Traveled to 26 countries
- Served in the Air Force
- Fan of musicals & Marvel Studios
- Pineapples does not go on pizza





# What are we going to do?

Breaking the ice: Dilemmas on Friday

How to be successful in lab sessions

Recap to give you a big picture

Group activity



# Dilemmas on Friday

From Dilemmas op Dinsdag: Choose between the two options!

There is a chocolate river through your garden.



All the animals do everything you say.



OR





# Dilemmas on Friday

How about this?

Every psychology course is taught at 9 am.



OR

Every psychology course focuses on statistics.





# How to be successful

## Purpose

Provide extra exposure to statistical concepts and exercises

## What can you expect from me?

**ANY HELP** to be successful on this course :)

## What can I expect from you?

Active participation

Ready to enjoy the world of statistics

Be kind to each other



# Recap: Research design

## Research design

To answer your research question, how do you plan to carry out research?

## Can you distinguish them?

### Experimental method

Manipulation of a variable  
Random assignment  
Causal inference

### Quasi-experimental method

Manipulation of a variable  
No random assignment  
Causal inference

### Correlational method

No manipulation of a variable  
Observational  
No causal inference

## Wait... there are three important terms

Manipulation, random assignment, and causal inference



# Recap: Research design

## What is manipulation?

To investigate the effect of the independent variables, researchers vary the conditions/levels of the independent variables on purpose. This process is referred to as manipulation.

## What is the purpose of the random assignment?

Participants are randomly assigned to groups to ensure that group differences stem from intervention/treatment/control rather than preexisting effects.

## What are the conditions for causal inference?

1. An observed relationship/pattern
2. Temporal precedence
3. Ruling out alternative explanations



# Recap: Measurement

## Measurement

We assign numbers to studied objects (e.g., people, animals) to investigate them.

### Observable entities

Physically observable  
Tangible characteristics  
Manifest variable

#### Examples

Height, BMI, and heart rate of people  
Test scores on math and language  
How often you meet your friends a week

### Latent construct

Physically unobservable  
Psychological characteristics  
Latent variable

#### Examples

Health of people  
Academic achievement  
Extraversion and introversion



# Recap: Analysis

## Statistical analysis

We employ tools or models to describe, understand, and interpret the relationship observed in the data.

## There are terms we learned!

- Population vs. Sample
- Parameter vs. Statistic
- Descriptive Statistics vs. Inferential Statistics
- Categorical (dichotomous vs. polytomous) Variable vs. Numerical (discrete vs. continuous) Variable



# Recap: Analysis

Let's play with Pokemons

Population



Sample





# Recap: Analysis

## Types of variables

- Categorical variable: Numbers are just categories
  - Dichotomous variable
    - *result of coin toss: heads or tails*
  - Polytomous variable
    - *country of origin, Letter grade (A-F)*
- Numerical variable: Numbers represent magnitude
  - Discrete variable
    - *the number of people*
  - Continuous variable
    - *age, temperature, height, weight*



# Group activity

## Case 1

Ihnwhi studied the effect of statistics education settings for high school students in the United States. He recruited 300 students in total. Next, 100 students were randomly assigned to either an offline small-size classroom, an offline large-size classroom, or an online platform. Students in each condition subsequently took an exam of 20 questions. The average score was 15.7 for the offline small-size classroom, 8.1 for the offline large-size classroom, and 9.4 for the online platform.

## Can you answer below?

- What is the research design? Why do you think so?
- Are there any observable entities or latent constructs?
- What are the population and the sample? Can you guess what would be the parameter and the statistic?
- Are there any variables? What is the type?



# Group activity

## Case 2

Matthew is interested in investigating the relationship between life satisfaction and academic achievement for UC Merced students. He plans to recruit 150 students from all the departments. Then, he will administer two questions to measure life satisfaction. One asks how often students join extracurricular activities a week (on a 10-point scale from 1 through 10). Another questionnaire asks how much students receive financial support from the university this semester (in \$). For academic achievement, he will collect the GPA (A~F) of students. He expects that the higher the measures of life satisfaction are, the higher the measure academic achievement is.

## Can you answer below?

- What is the research design? Why do you think so?
- Are there any observable entities or latent constructs?
- What are the population and the sample? Can you guess what would be the parameter and the statistic?
- Are there any variables? What is the type?



# Group activity

## Case 3

Alejandra has been working on a cross-cultural research project about differences in the level of empathy. A sample consists of 2000 participants with different ethnographic backgrounds (Americans, Africans, Asians, and Europeans). Participants are asked to respond to several empathy items to measure their empathy level. The empathy level is categorized as the lowest level, lower level, neutral level, higher level, and the highest level. She expects that there are no differences in the level of empathy between different ethnographic backgrounds, both in the sample and the population.

## Can you answer below?

- What is the research design? Why do you think so?
- Are there any observable entities or latent constructs?
- What are the population and the sample? Can you guess what would be the parameter and the statistic?
- Are there any variables? What is the type?



# Before you go home...

Lab materials are also available at

<https://github.com/IhnwhiHeo/PSY010>

Any questions or comments?



# Thanks! Have a wonderful weekend!

