



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!

