# Content

***All about experiments and ANOVAs:***

**What features must you have in an experiment?**

**What is an extraneous variable?**

**What is a confounding variable?**

**How do we control for extraneous variables?**

**What is the independent (predictor) variable?**

**What is a “factor”?**

**What is the dependent (outcome) variable?**

**What kinds of measurements can we use to operationalize our variables?  
What does it mean to operationalize a variable (i.e., to create an operational definition)?**

**What are the pros and cons of different measurements?**

**What are the different types of validity?  
What is a single blind experiment?  
What is a double-blind experiment?**

**What is the purpose of an ANOVA?**

**When do we need to run an ANOVA instead of a t-test?**

**What are post-hoc tests and when do we run them?**

***All about observational methods***

**What are the different observational methods?**

**What are the pros and cons?**

**What is inter-rater reliability?**

***All about survey methods***

**What are the pros and cons of survey research?**

**What is the difference between a closed and open-ended survey question?**

**What are the pros and cons of each?**

**What is a Likert-type rating scale?**

**What do we mean by “anchors” on a rating scale?**

**What do we mean when we talk about the reliability of a survey or questionnaire?**

**What are the rules of survey construction? (What should you avoid doing)**

**How can the wording of a survey influence or bias the responses you collect?**

**What do we do with reverse-scored items on a questionnaire?**

**What to we analyze from a questionnaire?**

***All about correlations***

**What is a correlation?**

**With a Pearson correlation coefficient, how do you determine the *strength* versus *direction* versus *statistical significance* of the correlation?**

**What do we mean by a positive versus a negative correlation? How can you tell them apart on a graph?**

**Correlation coefficients can vary from a value of \_\_\_\_\_\_\_ to \_\_\_\_\_\_\_ .**

**When do you run a correlation?**

***Reliability & Validity***

**What is reliable?**

**How can we improve inter-rater reliability?  
How can we improve survey reliability?**

**What is test-retest reliability and how is that different from the overall reliability of a survey that we calculate?**

**What is internal validity? How do we increase our internal validity?**

**What is external validity? How do we increase our external validity?**

**What is construct validity?**

**How does the process of operationalizing our variables relate back to the ideas of reliability and validity?**

# Skills

**Identifying factors (independent variables) and levels:**

1. An instructor wants to know whether students who began as first-years versus transferred in later show different academic outcomes. The instructor is also interested in whether there are differences by major, categorized into STEM, social sciences, humanities, and arts.

Name the first factor:

How many levels does it have, and what are they?

Name the second factor:

How many levels does it have, and what are they?

What is the dependent variable?

This is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ design.

1. A marketing executive needs to find out which type of toy will bring the most customers to check out the company’s website. They run a series of ads that vary in the toy they show. First, the ads differ in whether they show a toy classified as for younger (ages 2-6) or older (ages 8-12) children. They also differ in whether the toy is electronic (e.g., battery operated) or not. They measure how many “clicks” each ad receives.

Name the first factor:

How many levels does it have, and what are they?

Name the second factor:

How many levels does it have, and what are they?

What is the dependent variable?

This is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ design.

What analysis would she conduct?

1. A social worker wants to help their client learn how to keep better track of their chores and bills. They plan to have the client try four ways of organizing themselves across multiple months. The social worker first wants to see whether the client works better using a calendar versus a document/spreadsheet to record all their deadlines. The social worker also wants to see whether the client works better doing this digitally (recording it on the computer/phone) versus on paper (in a paper planner or journal). The client has to try to take notes using the assigned method for a month and they count how many deadlines, bills, etc, were missed at the end of each month to see which method might be most effective for them.

Name the first factor:

How many levels does it have, and what are they?

Name the second factor:

How many levels does it have, and what are they?

What is the dependent variable?

This is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ design.

What analysis would she conduct?

1. Dr. Munoz wants to know whether a medication is more effective than a placebo at reducing anxiety. She administers the drug to half of her anxious patients and the other half are administered a placebo. At the end of two weeks, she has them complete a self-report on their symptoms of anxiety.

Name the first factor:

How many levels does it have, and what are they?

What is the dependent variable?

What analysis would she conduct?

1. Now imagine she decides instead that she wants to test two drugs and a placebo. So instead, she has 1/3 of her patients take Drug A, 1/3 of her patients take Drug B, and 1/3 of her patients take the placebo. Her plan is still to have them complete a self-report of their anxiety symptoms after two weeks.

Name the first factor:

How many levels does it have, and what are they?

What is the dependent variable?

What analysis would she conduct?

Is this between-subjects or within-subjects?

# Identify the variables.

1. A professor wants to know whether timing affects academic performance. He predicts that students will perform better on a 50-question Psychology multiple-choice exam if taken in the morning rather than the evening. The professor has the 20 Psych majors in the class take the exam in the morning and has the 20 non-majors take the exam in the evening. The professor then compares their exam scores.
   1. What is the independent variable (factor)?
      1. How many levels does it have and what are they?
   2. What is the dependent variable?
   3. How did the professor operationalize “timing?”
   4. How did the professor operationalize “academic performance”
   5. What is a potential confounding variable?
2. A parent wants to know whether their baby has an allergy to lactose. For two weeks, the baby drinks milk with lactose and the parent records the number of soft and firm stools in the baby’s diapers (with soft stools indicating more of an allergy). Then, the parent switches to a lactose-free formula and again records the number of soft and firm stools for two weeks.
   1. What is the independent variable (factor)?
      1. How many levels does it have and what are they?
   2. What is the dependent variable?
   3. How did the parent operationalize “lactose” in the baby’s diet?
   4. How did the parent operationalize a “lactose allergy”?
   5. What is a potential confounding variable?

# Writing up ANOVA results in APA style. Imagine you had the following output from an ANOVA.

## ANOVA

| **ANOVA - RTKids** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Cases** | | **Sum of Squares** | | **df** | | **Mean Square** | | **F** | | **p** | |
| Theme |  | 1502.086 |  | 2 |  | 751.043 |  | 3.533 |  | 0.037 |  |
| Residuals |  | 10840.229 |  | 51 |  | 212.554 |  |  |  |  |  |
|  | | | | | | | | | | | |
| Note.  Type III Sum of Squares | | | | | | | | | | | |

### Descriptives

| **Descriptives - RTKids** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Theme** | | **Mean** | | **SD** | | **N** | |
| Hero vs. Society |  | 74.714 |  | 19.576 |  | 7 |  |
| Hero vs. Villain |  | 81.000 |  | 14.422 |  | 42 |  |
| Self Growth |  | 96.800 |  | 1.789 |  | 5 |  |
|  | | | | | | | |

### Post Hoc Tests

#### Standard

| **Post Hoc Comparisons - Theme** | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | | **Mean Difference** | | **SE** | | **t** | | **p tukey** | |
| Hero, vs., Society |  | Hero, vs., Villain |  | -6.286 |  | 5.952 |  | -1.056 |  | 0.545 |  |
|  |  | Self, Growth |  | -22.086 |  | 8.537 |  | -2.587 |  | 0.033 | \* |
| Hero, vs., Villain |  | Self, Growth |  | -15.800 |  | 6.897 |  | -2.291 |  | 0.066 |  |
|  | | | | | | | | | | | |
| \* p < .05 | | | | | | | | | | | |
| Note.  P-value adjusted for comparing a family of 3 | | | | | | | | | | | |
|  | | | | | | | | | | | |

# Correlation Practice

Here is the output from running correlations on the Disney dataset:

## Correlation Matrix

| **Pearson Correlations** | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | | **RTKids** | | **RTCritics** | | **RTAudience** | |
| RTKids |  | Pearson's r |  | — |  |  |  |  |  |
| p-value |  | — |  |  |  |  |  |
| RTCritics |  | Pearson's r |  | 0.259 |  | — |  |  |  |
| p-value |  | 0.058 |  | — |  |  |  |
| RTAudience |  | Pearson's r |  | 0.159 |  | 0.697 | \*\*\* | — |  |
| p-value |  | 0.251 |  | < .001 |  | — |  |
|  | | | | | | | | | |
| \* p < .05, \*\* p < .01, \*\*\* p < .001 | | | | | | | | | |

Which correlations are statistically significant?

Which are not?

Which is the largest correlation?

Is there a (linear) relationship between the kids’ ratings of Disney movies and critic ratings?

Write up the results describing how the various Rotten Tomatoes ratings relate to each other (in APA style)

TEMPLATE FOR CORRELATION WRITE-UPS.

[VARIABLE 1] (M = , *SD* = ) and [VARIABLE 2] (M = , *SD* = ) were [positively/negatively/not significantly] correlated, *r*( ) = \_\_\_, *p* = \_\_\_\_.