

Real Intro

Goals of this sequence

- Develop the basic quantitative skills necessary to be a research scientist
 - Not all the skills you will need (not the only courses you need)
 - Foundations of statistics, methods, and data science
- Contextualize those skills
 - Building a toolbox, not a cookbook
 - How can I use this? Under what circumstances? When should I not use this?
- Sequence
 - **5066**: Tools of statistics (distilling lots of data to interpretable numbers, sampling, hypothesis testing)
 - **5067**: Building models (how do translate our theory into testable relationships using the tools of 5066)

Goals of this course

- Conceptualize **statistics** as a method for specifying and testing a model of how the world works
- Execute and understand of the use and limitations of null hypothesis significance testing
- Summarize, test, and display data using R
- *Ideally* everyone will learn at least one thing they can use in their research this term.

Challenges

Many basic statistical tests were developed a century ago. Your goal should not be to just do the test. It should be to understand what the test does, why you might want to use it, and how you can avoid abusing it

I'm a Psychologist and Neuroscientist. This class is in the Psychology department. It's goal is to train the next generation of Psychologists. Examples will primarily be in Psychology (occasionally some pop culture for funzies).

Setting Expectations

My job is to balance theory and application. Everyone is coming here with *extremely* different backgrounds. The course evals are always...mixed.

too fast? - COME TALK TO ME. Also, spend lots of time outside of class; learning takes time.

too slow? - COME TALK TO ME. There are lots of extensions to these concepts. I can give you extra readings, point you in interesting directions, or provide resources for improving your R code

Important Links

Class Website -- syllabus, lecture slides, homeworks etc.

Slack Workspace -- here for answering questions, posting stats/**R** memes, building community

Canvas -- where you will turn in your homeworks and view your grades

Data from class examples can be found on our **GitHub** site in the **data** folder

Learning Statistics with R -- textbook by Danielle Navarro

Important Info

- **Most important information is on the slides**
- Readings serve to *supplement* and enhance
- Important equations will be presented in the slides

Questions?

Kinds of statistics

- Descriptive (about the data)
- Inferential (about the world)

Neither is more important than the other!!

Kinds of statistics

- Exploratory (I don't have a hypothesis or theory. I don't know what's going to happen)
- Confirmatory (If theory X is true, then the data I collect should look like Y)

Neither is more important than the other!!

Exploratory ----- Confirmatory

Kinds of research

- Experimental (we introduce an intervention and look at the effects; researcher introduced assignment)
- Observational (we measure/survey our participants without trying to affect them; no researcher-introduced assignment)

Typically we pair some kinds of statistical tests with experimental work and other kinds of tests with observational work.

Kinds of research

In reality, most statistical tests can be used with most kinds of research. It's not so much the kind of research that matters, but **which statistic helps to answer your question** and **what types of variables do you have?**

- We'll discuss the first point throughout the course
- Let's discuss variables now

Next time

Models