

The background features a light gray geometric pattern of overlapping triangles. In the center, there are two gray silhouettes of human heads facing each other. Between them are two overlapping speech bubbles, one light green and one light blue.

Exploring and understanding data

PSYC 11: Laboratory in Psychological Science

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Truth and data

Can Data Reveal Truth?

- The "universe" produces data
- Math doesn't lie -- but **analyses** involve choices
- Different analyses can lead to different conclusions
- The same dataset can tell very different stories

What patterns should you look for?

First Steps with Any Dataset

- **Shape:** How many observations? How many features? Any missing data?
- **Distributions:** Are values clustered? Spread out? Skewed?
- **Relationships:** Do any features move together? In opposite directions?
- **Outliers:** Are there values that seem "wrong" or surprising?

The power of visualization

Why Plot Your Data?

- Tables of numbers hide patterns; plots reveal them
- Different plot types answer different questions:
 - **Histograms:** What does the distribution look like?
 - **Scatter plots:** How are two variables related?
 - **Bar charts:** How do groups compare?
- Always look at your data **before** running statistics

Discussion: "What does this graph tell you?"

Breakout Groups (10 min)

- Each group: create a quick plot from your sleuthing dataset
- Trade plots with a neighboring group
- For the plot you receive, discuss:
 - What **story** does this plot tell?
 - What is it **not** telling you?
 - What follow-up plot would you want to see next?

Analytic flexibility

Multiple Paths, Multiple Conclusions

- There are typically many ways to analyze data
- Different choices (which subset, which test, which visualization) can lead to different conclusions
- This is why **transparency** about your analysis choices matters

What's in your toolkit?

From Simple to Sophisticated

- Observation, intuition, and logic
- Simple summaries (mean, standard deviation, sorting)
- Traditional statistical tests (t-tests, correlations, ANOVAs)
- Fancier methods and simulations

Getting help

Resources

- Teaching staff (instructor + TAs)
- Other students
- Slack (#stats-stuff, #data-sleuthing-lab)
- Google, Stack Exchange, Wikipedia, ChatGPT/Claude/ai.dartmouth.edu