some loose notes for interpreting quantitative data, based on Roediger & Karpicke (2006)

Aleksandra Kaszowska

What are we doing here?

article: Henry L. Roediger, III, and Jeffrey D. Karpicke (2006). Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention. *Psychological Science, 17*(3), 249-255.

Roediger&Karpicke(2006) is a neat example of an experimental study on *testing effect*, a phenomenon where taking tests on previously learned material results in better retention compared to spending the same amount of time restudying said material. This phenomenon seems to be somewhat independent of receiving feedback on how well you tested (feedback improves retention even further, but testing effect takes place even without feedback).

This article is interesting for other reasons: namely, it is a great case study of how important it is to understand the *data collection methods* in order to understand the findings and their implications.

Main experimental finding

Taking Memory Tests Improves Long-Term Retention

Literal interpretation of main experimental finding

If you read only the results section and interpret the main experimental finding literally, you can get something like this:

- **Tests**: my first association with tests is exams, grading, standardized scores. So here I am imagining students taking a standardized graded exam in my classroom every week. There is no room for actual learning because we spend so much time taking exams all the time!
- **Memory Tests**: The exam is testing their memory, so their ability to recall things as accurately as possible. There seems to be little room for creativity, interpretation, or critical thinking when students take memory tests.
- **Improves**: If I want to talk about improving, then I usually need a score to assess it. So this word implies that I am interested in students test scores on tests that require them to memorize and repeat information, and how those scores get higher if I keep on relentlessly testing them. This does not sound fun.
- **Retention**: This is my pedagogical objective here: improving students' ability to not only memorize definitions. Retention means "memorizing accurately."
- **Long-Term Retention**: I want the students to commit the definitions they memorized in my class to their long-term memory, therefore I define successful learning as memorizing things forever.

CONCLUSION: I want my students to memorize things without thinking about them critically, I want my students to memorize things and never forget them, and I will torture my students with repeated exams (instead of actually fostering their learning in the classroom) to achieve that goal.

Critical interpretation of main experimental finding

If you read the methods and results section, and understand how the data were collected, you will arrive at a different interpretation of the main finding:

- **Tests**: in this experiment, students read a passage of text, and then the "test" was to recall as many details of the story. So the "test" was students re-telling the story they have just read. The students did not receive any feedback on their story retelling.
- **Memory Tests**: The test assesses how many details of the story the students recalled correctly, not if they could re-tell the story verbatim (word-for-word). Stories follow logical order, so remembering facts from the story usually also requires students to remember the logical order of what happened in the story, so the memory that we test here is also the ability to remember logical order of things (which is a higher thinking skill).
- **Improves**: They were scored on how many details of the story they remembered. So here I am interested in how I can help my students remember more facts so their story-retelling is more accurate.
- **Retention**: This is my pedagogical objective here: improving students' ability to not only memorize things, but also recall them correctly. Retention means "memorizing accurately".
- **Long-Term Retention**: I want the students to commit the information they learned in my class to their long-term memory, therefore I define successful learning as memorizing things forever.

CONCLUSION: I want my students to remember information, I want my students to remember that information for as long as possible, and to achieve that goal I will ask my students to re-tell me the information in their own words right after they learned it.