MRM course wrap-up

1 December 2021

Modern Research Methods

Everyone completed their poster and posters have been printed for tomorrow – Congrats!

Poster Session

- Poster session from 4:30 to 6pm tomorrow (Thursday), Baker Hall 336
- Be there a **few minutes** early to set up
- I'll bring your printed posters
- 10 points extra credit for winning an award

Preparing for questions

- Document with questions to be prepared for:

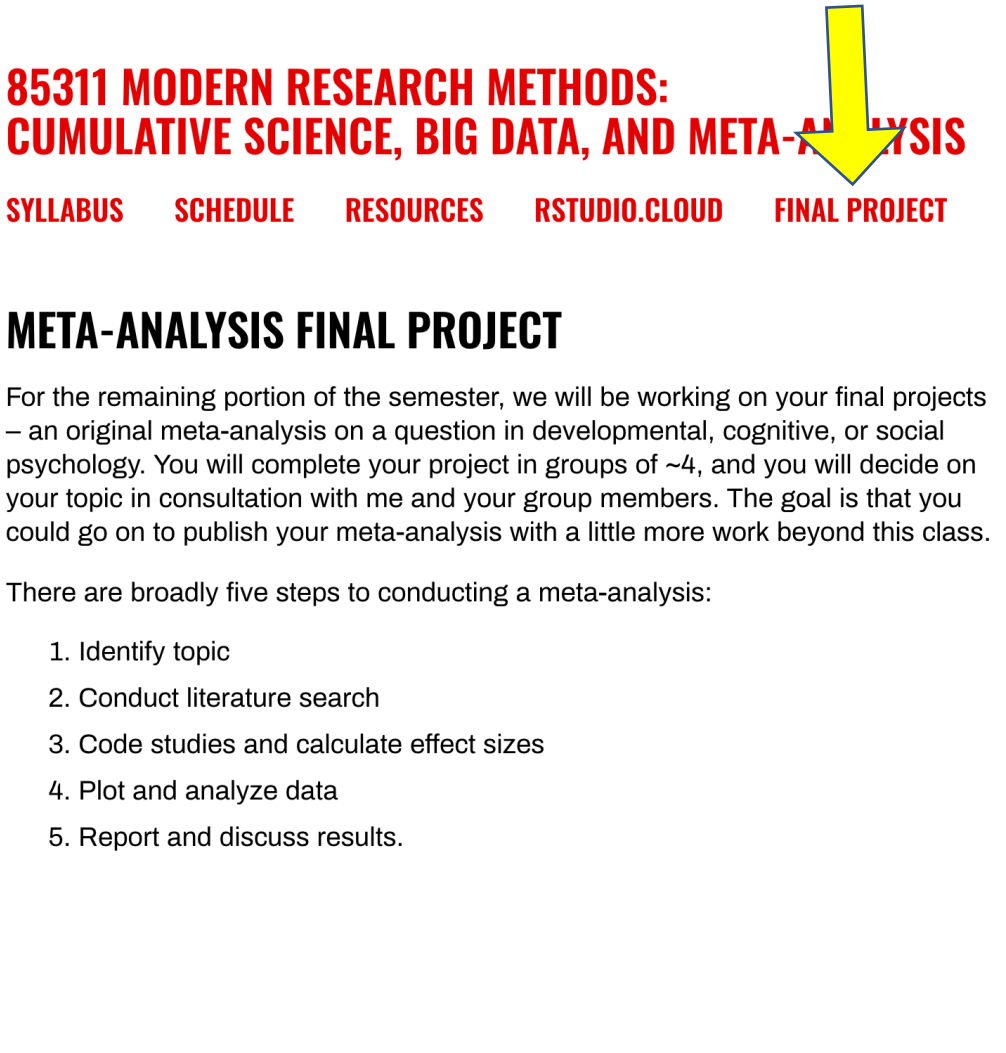
In your Q&A poster session, judges and community members will ask you questions about the research you did. Here are some questions you should be prepared to answer:

1. What's an effect size?
2. What does a positive effect size mean? What does a negative effect size mean?
3. What's a moderator?
4. Are there other moderators that you didn't code that you think might be interesting?
5. Explain the flow diagram to me. What does "Records screened" mean?
6. What does a meta-analysis tell you that a literature search does not?
7. What are those bars on the forest plot? What is a confidence interval?
8. Is this a small, medium or big effect size?
9. What does the red diamond stand for?
10. Why are the squares different sizes on the forest plot?
11. What is publication bias?
12. Explain to me what the funnel plot means. What would evidence for publication bias look for?
13. What are some limitations of your study?

[Google doc with questions]

Final Project Write-up

- Due **December 9th at noon**.
- Take everything you've done over the course of Assignments 6-8 and the poster, and write it up into a single document
- Each person must complete their own write-up
- There's a Rmarkdown template on the website for the write-up
- And, lots of information on the website about how to do the writeup itself



85311 MODERN RESEARCH METHODS:
CUMULATIVE SCIENCE, BIG DATA, AND META-ANALYSIS

SYLLABUS SCHEDULE RESOURCES RSTUDIO.CLOUD FINAL PROJECT

META-ANALYSIS FINAL PROJECT

For the remaining portion of the semester, we will be working on your final projects – an original meta-analysis on a question in developmental, cognitive, or social psychology. You will complete your project in groups of ~4, and you will decide on your topic in consultation with me and your group members. The goal is that you could go on to publish your meta-analysis with a little more work beyond this class.

There are broadly five steps to conducting a meta-analysis:

1. Identify topic
2. Conduct literature search
3. Code studies and calculate effect sizes
4. Plot and analyze data
5. Report and discuss results.

Final paper details

Introduction:

- Minimum of 800 words.
- Introduce the question your MA addresses and why it is important
- Introduce seminal paper (method, finding, results)
- Briefly describe how other papers have built on the seminal paper
- Can reuse text from Assignment 6, after you have incorporated feedback from assignment

Methods:

- Minimum of 600 words
- Paper selection method (inclusion criteria)
- Description of variables coded
- Description of effect size measure
- Search protocol
- PRISMA flow diagram

Final paper details

Results:

- Include forest plot, funnel plot and moderator plots and describe the results of each.
- You should plot and discuss the results of at least 3 different moderators
- When you discuss the results of a moderator you should include two things: (1) What the effect is (e.g., "Older children showed a bigger mutual exclusivity effect"), and (2) What that means in plain English (e.g., "Older children were more likely to select the novel object, relative to the familiar object when presented with a novel word").
- There is no minimum word count for the results section, but you should be sure to address the above topics

Discussion:

- Minimum of 800 words
- Summarize all of your results
- Interpret your moderators. What does the fact that you do or do not see an effect of each moderator mean? Why might that be the case>?
- How does this effect compare to other effect sizes in the psychology literature?
- What are some limitations of your method?
- What would you do if you had more time?

Today

- Pair up with another group, and do a practice run through of your presentation
- The PRESENTER GROUP should pull up the poster on one computer and then present as though it's the real thing
- One person in the AUDIENCE GROUP should be the timer (aim for no more than 4 minutes)
- After the presentation, each member of the AUDIENCE GROUP should say **one thing the liked**, and **one thing that was confusing**.
- When you're done, switch roles so the presenter group becomes the audience group

Other logistics

- If you'd like to practice your presentation before tomorrow, Roderick has kindly offered to provide feedback virtually – email him.

- **Course evaluations** – should have gotten an email about this, please take a few minutes to feel this out.

Topics we've covered

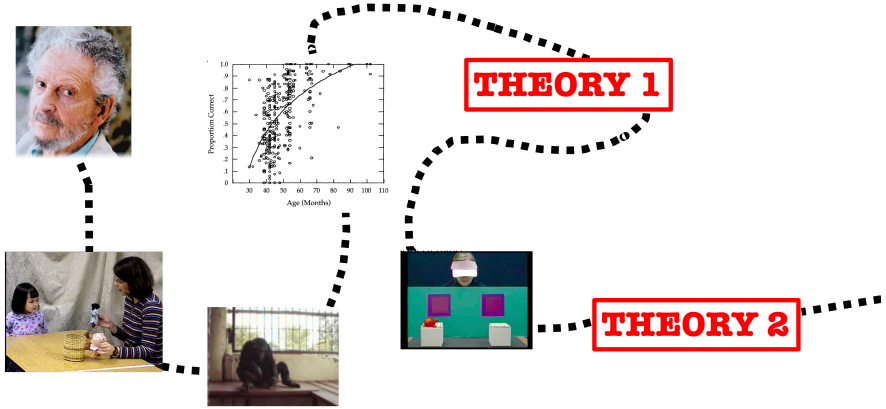
1) **Philosophy of Cumulative Science**

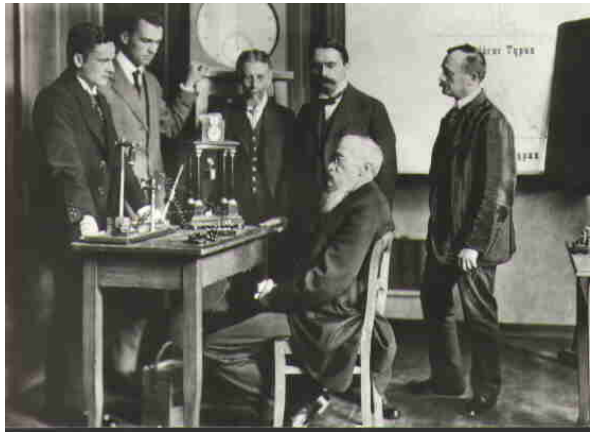
2) **The Single Experiment** – Experimental data, tools in R for working with data and plotting data, reproducibility

3) **Repeating an Experiment** – Intro to statistical concepts, replication of experiments

4) **Aggregating Many Experiments** – Meta-analysis

Philosophy of Cumulative Science





The Single Experiment

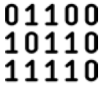
Population 

Question 

Hypothesis 

Exp. Design 

Experimenter 

Data 

Analyst 

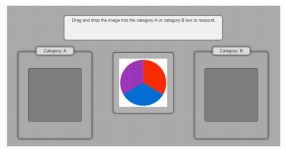
Code 

Estimate 

Claim 

Repeating an experiment

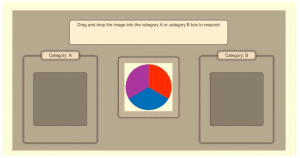
Original



predicting participants' trial-by-trial accuracy on training trials from condition, including a by-subject random intercept.[3] We used the lme4 package version 1.1-21 in R (version 3.6.1) to fit all models (D. Bates & Maechler, 2009; R Development Core Team, 2019). Participants in the High Nameability condition (M = 84.0%, 95% CI = [78.6%, 89.4%]) were more accurate than participants in the Low Nameability Condition (M = 67.7%, 95% CI = [59.9%, 75.4%]), b = 1.02, 95% Wald

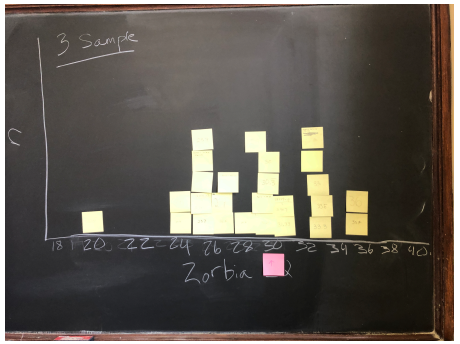
Replication

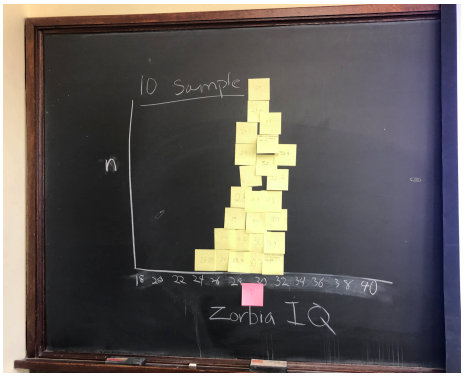
[You]

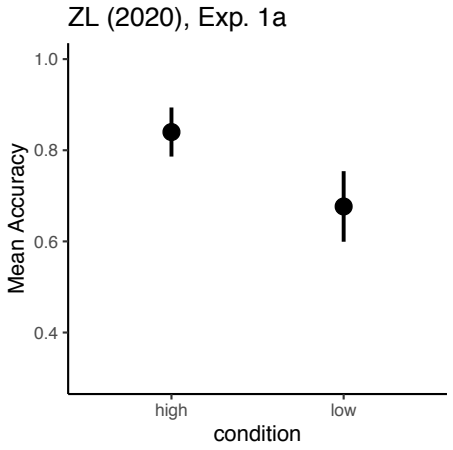


High Nameability Condition = 75%
Low Nameability Condition = 69%

More samples -> less variance -> more certainty



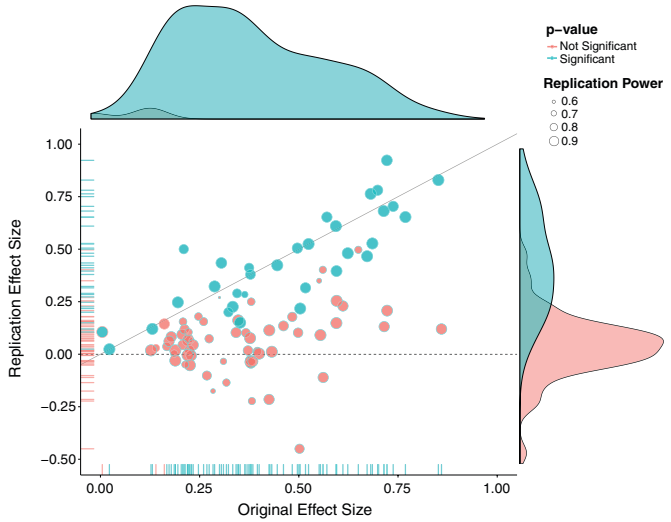




Effect size as unit of analysis: Quantitative, scale-free measure of an effect.

Cohen's *d*:

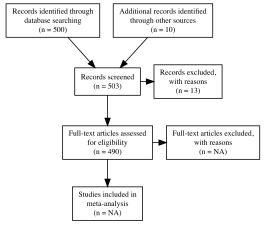
$$\text{Effect Size} = \frac{\text{diff. between means}}{\text{standard dev.}}$$

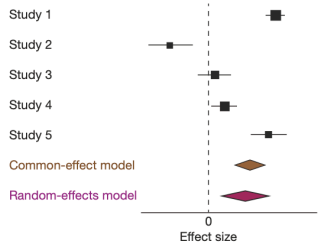


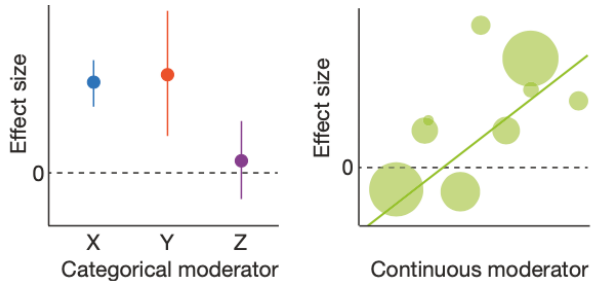
Aggregating Many Experiments

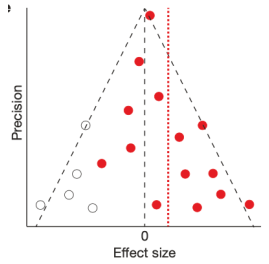
Meta-analysis: A quantitative approach to summarizing results across studies using effect sizes

1. Identify Topic
2. Conduct literature search
3. Code studies and calculate ES
4. Plot and analyze data
5. Report and discuss results



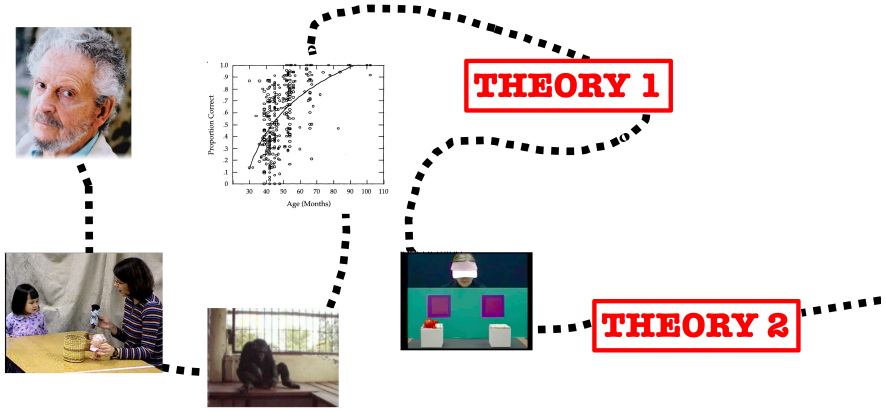


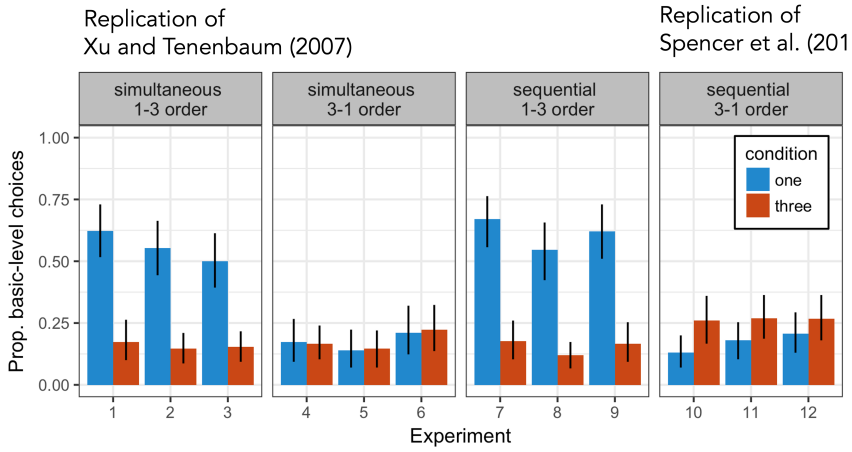


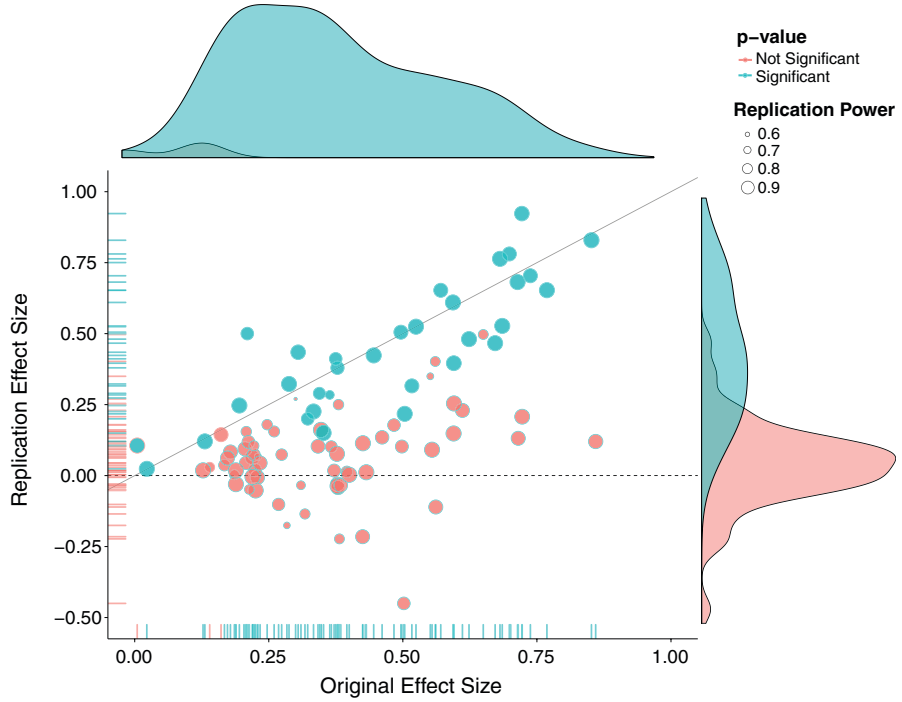


Three core ideas I hope you take away from this course

Core Idea 1: Science is messy, but we have tools for finding "signal" in the mess

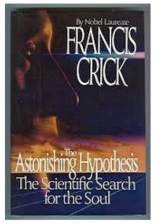






Core idea 2: Be a critical consumer of a science

- And this class has given you a lot of tools for doing so
- When you hear about a new finding, you should ask questions like,
  - How big is the effect?
  - Do I sense p-hacking?
  - Has it been replicated by another group?
  - Is their data and code available so I can check it out?
  - Is there a meta-analysis on the topic? Is there an effect in the meta-analysis? Is there evidence for publication bias?



Read Passage

Anti-free-will essay

Consciousness essay (control)

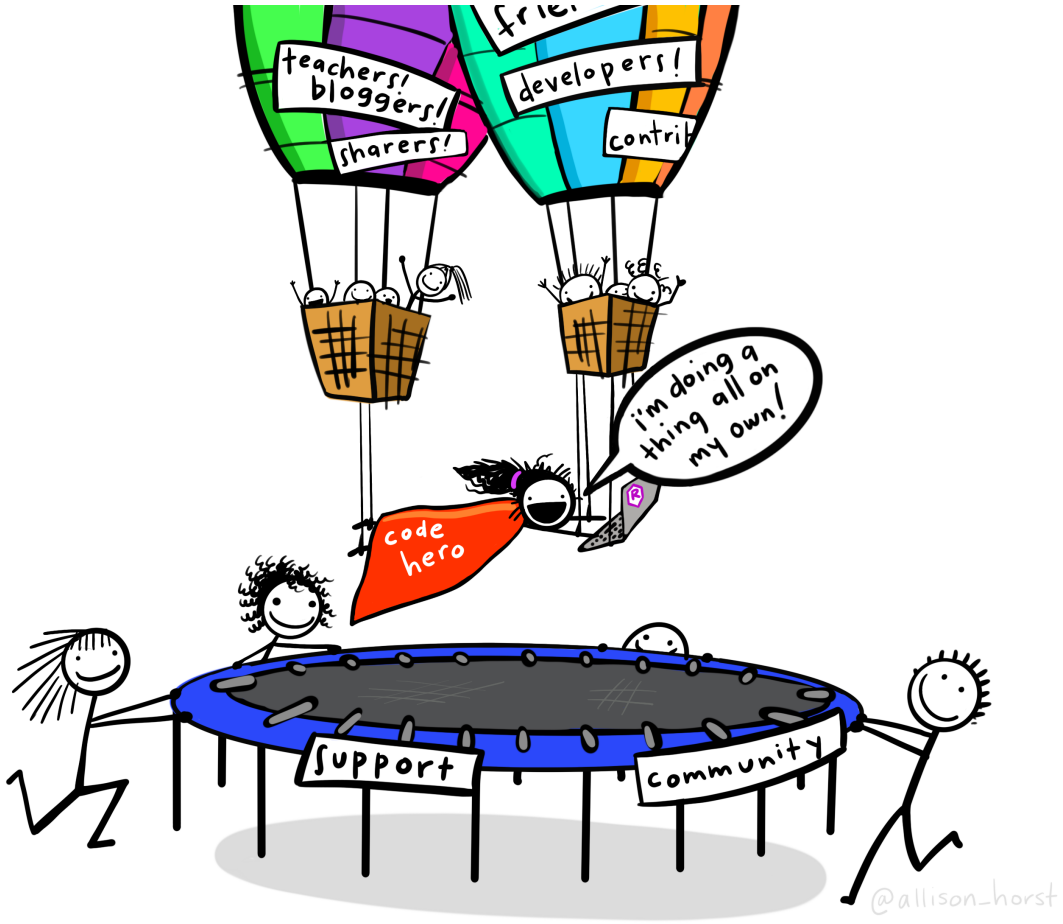
Core idea 3: R and the tidyverse provide a rich set of tools for doing data-analysis

You've now learned the basics.

- dplyr (tidyverse)
- ggplot (tidyverse)
- metafor
- R Markdown
- R Studio

And you have the foundation to learn more

https://education.rstudio.com/



Use your tools to go forth and be a critical consumer and producer of cumulative science!

See you tomorrow afternoon!