

Calculating ES for your MA

19 November 2021

Modern Research Methods

Logistics

- Poster draft due Tuesday (11/23, noon)
 - Should include 4 key figures and text
 - Along with your poster, submit the markdown that you used to create your plots
- 1 **markdown** and 1 **poster** per group (1 person from each group should turn in html of markdown on Canvas)
- In person poster session (4:30-6pm on Thursday, 12/2)

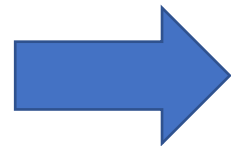
Raw data to visualizations

Group 2 MA data

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A meta-analysis of the mutual exclusivity effect in word learning [TEMPLATE]

Molly Lewis and other group members
Carnegie Mellon University
Modern Research Methods

Background

- Mapping a word to its referent is an under-constrained learning problem.
- One of the mechanisms hypothesized to constrain the problem is a bias to map novel words to novel objects – termed the “Mutual exclusivity (ME) effect”

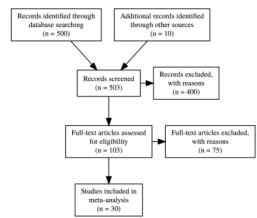


- Seminal Paper: Markman & Wachtel, 1988
- Conducted the ME paradigm with 3 and 4 year olds, and found that older but not younger children have shown the effect (+ additional methodological details)
- Since 1988, paper cited over 1000 times, and replicated with many methodological changes
- E.g., if there’s space briefly describe 1 other methodological version that have been conducted since the original

Research Goal: Evaluate the degree of publication bias in the ME literature, estimate the size of the effect, and examine potential moderators.

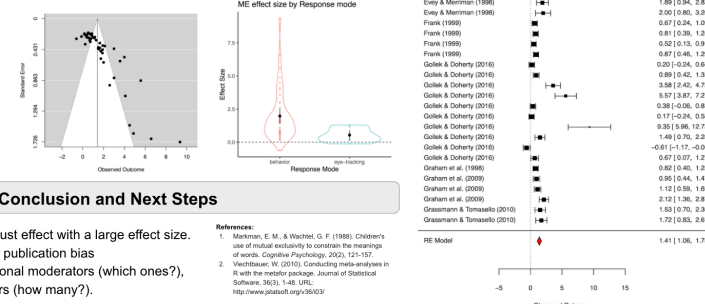
Method

- Meta-analytic approach
- Conducted database search on google scholar using term “mutual exclusivity”
- Inclusion criteria: child participants, no prior experience with objects, etc.
- Calculated effect size (Cohen’s *d*) as the proportion of children selecting the novel object, relative to familiar object
- Coded moderators: object type, demographic type
- Estimated effect size using *metafor* package in R (Viechtbauer, 2019)



Results

- 50 effect sizes
- Some evidence for publication bias
- Overall effect size is 1.41 [1.06, 1.75]
- Effect is bigger in X than Y, and is larger when X is larger (moderator analyses)



Conclusion and Next Steps

- Mutual exclusivity is a robust effect with a large effect size.
- There is little evidence for publication bias
- Next steps: Explore additional moderators (which ones?), and code remaining papers (how many?).

Step 1: Make sure your data sheet is "clean" and ready for analysis in R

- All missing values should be NA
- Clean up categorical variable levels (no more than ~4 levels per variable)
 - Don't delete old original variables! Just make a new one.
- Variables that are numbers (e.g., age) should be numbers (23 months -> 23)
- No ranges (.1-.3 -> .2)

Step 2: Calculate effect sizes in R

- Download data file as csv to your local computer
- Make a copy of R script titled "calculate_ES.R" in your folder
- Use tidyverse functions to do any additional cleanup on your data
 - Use **filter** to get the rows where paper eligibility is "include"
 - Use **select** to get rid of the columns that are empty/irrelevant
 - Use **mutate** to convert SEs to SDs ($SD = SE * \sqrt{n}$)
 - Impute missing SDs (talk to me about this)
 - For groups that are using a theoretical baseline, $SD_2 = SD_1$

Step 2: Calculate effect sizes in R

- We want point estimates and confidence intervals for effect sizes for each row
 - metafor is the package for construction meta-analytic models
 - It requires two variables: `d_calc` (point estimates) `d_var_calc` (for computing confidence intervals)
- Add two new columns to your dataframe: **`d_calc`** and **`d_var_calc`**
- Write dataframe to new csv titled "MA_data_with_ES.csv"

Step 3: Fit MA models and make four plot types

- Make copy of “Final_project_analyses_template.Rmd” in your folder
- Fit meta-analytic model
- Make PRISMA plot
- Make forest plot
- Make funnel plot
- Explore moderators, and make plots

Questions to ask yourself

- Are there any extreme outliers? Go back and check your coding.
- How big is the effect size? How does it compare to other ES in psychology?
- What are the limitations of your approach? What would make your analyses better?

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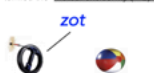


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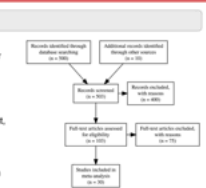


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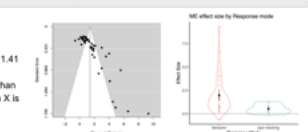
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