

The reproducibility of infant fNIRS studies: a meta-analytic approach

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INTRODUCTION

Meta-analysis

quantitative method to aggregate across studies, reveal effect size of a phenomenon, quantify its variability and investigate its moderators

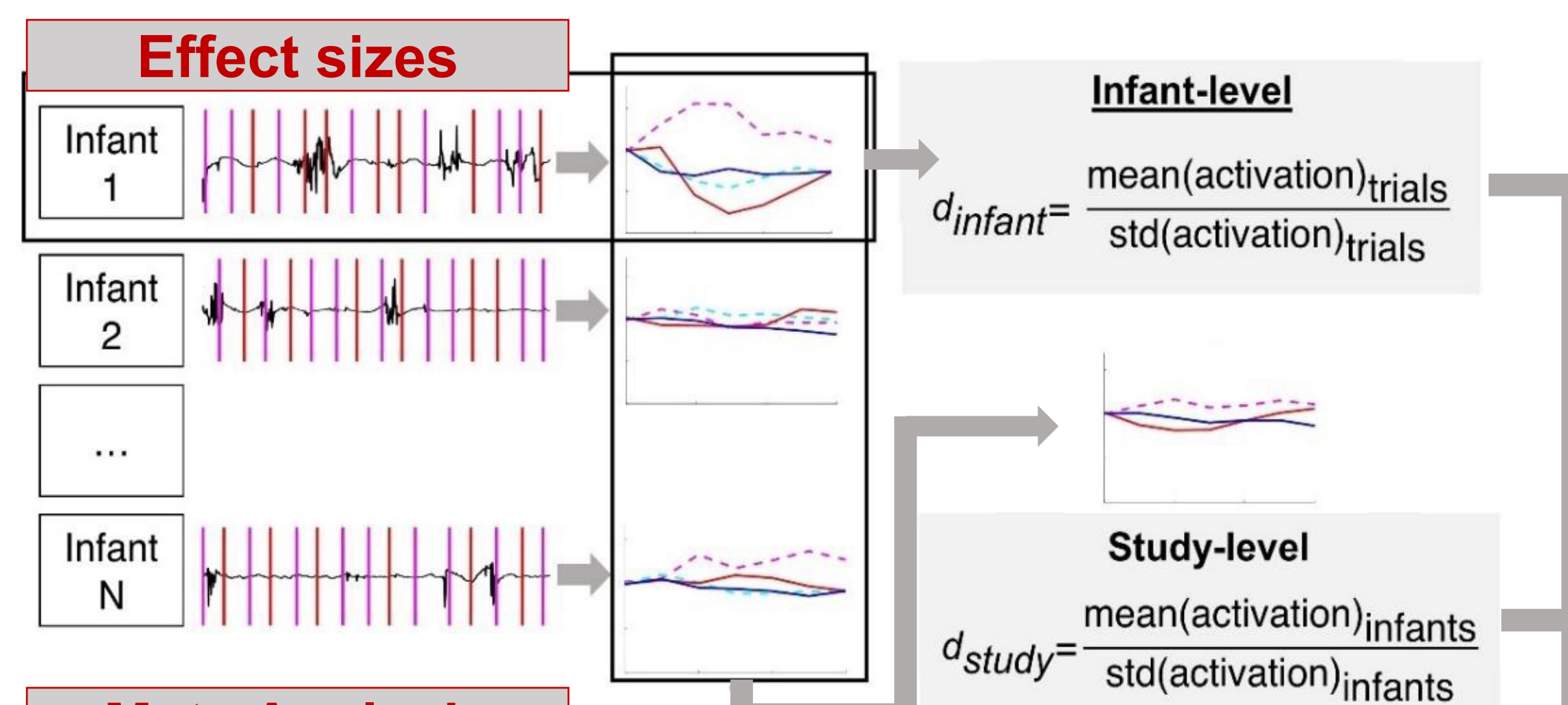
- **Goal of this work** is to exemplify its application on a set of infant fNIRS studies investigating repetition-based rule learning

DATA

Final sample after systematic search:

- 23 fNIRS studies on rule-learning with young infants (0-6 m), carried out in 4 different Labs (countries/machines/native language of participants)
- Stimuli: repetition-based- (“R”; e.g. AAB, ABB) and diversity-based regularities (“N”; e.g. ABC)
- Three separate meta-analyses:
 - R > 0 : 23 studies (487 infants)
 - N > 0: 17 studies (354 infants)
 - R > N: 19 studies (399 infants)

METHODS



Meta Analysis

- Random-effects only models (d_{study})
- Mixed-effects linear models (d_{infant})
- Moderators: Lab, Age, Repetition Position

Estimates of bias

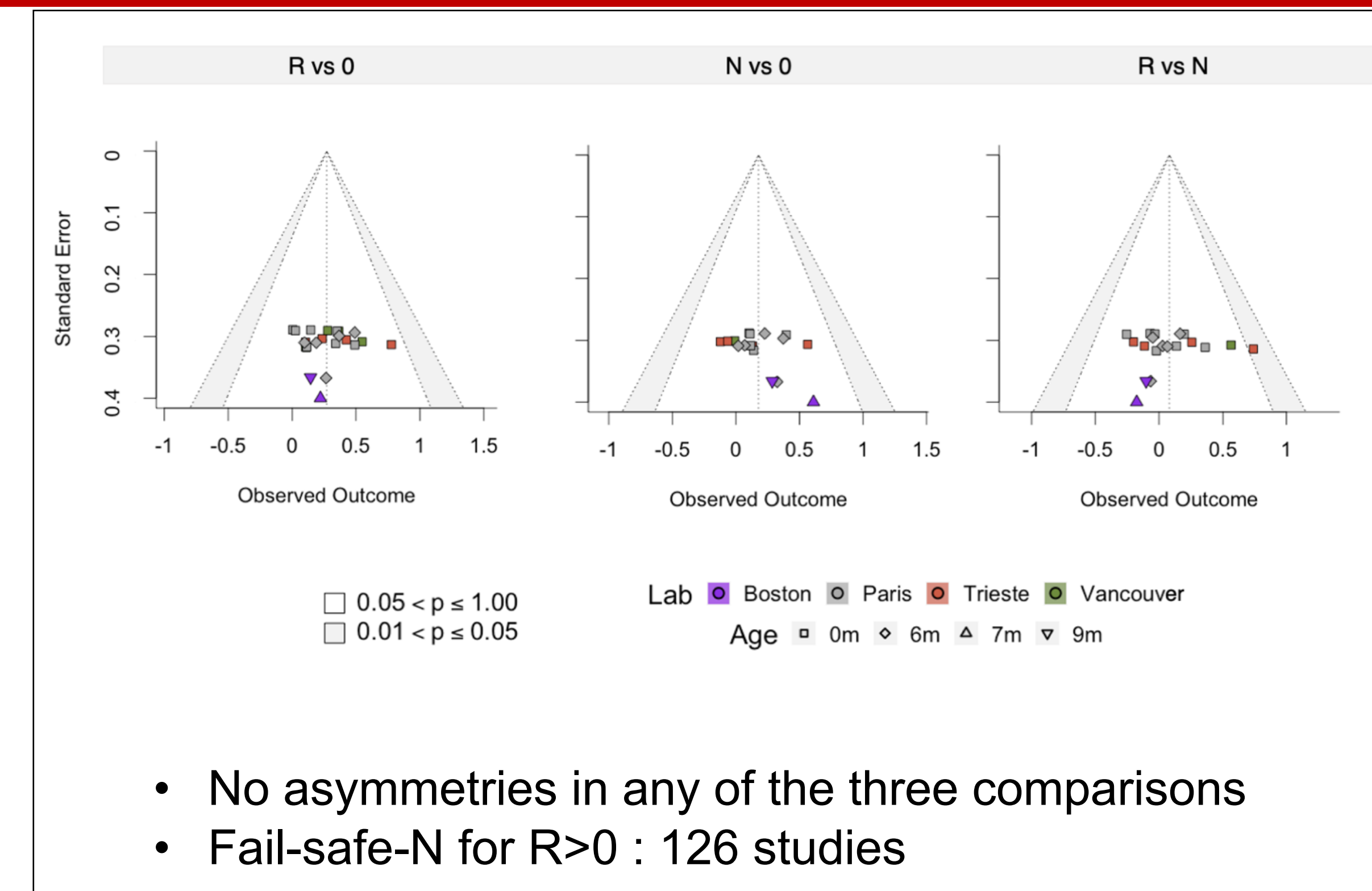
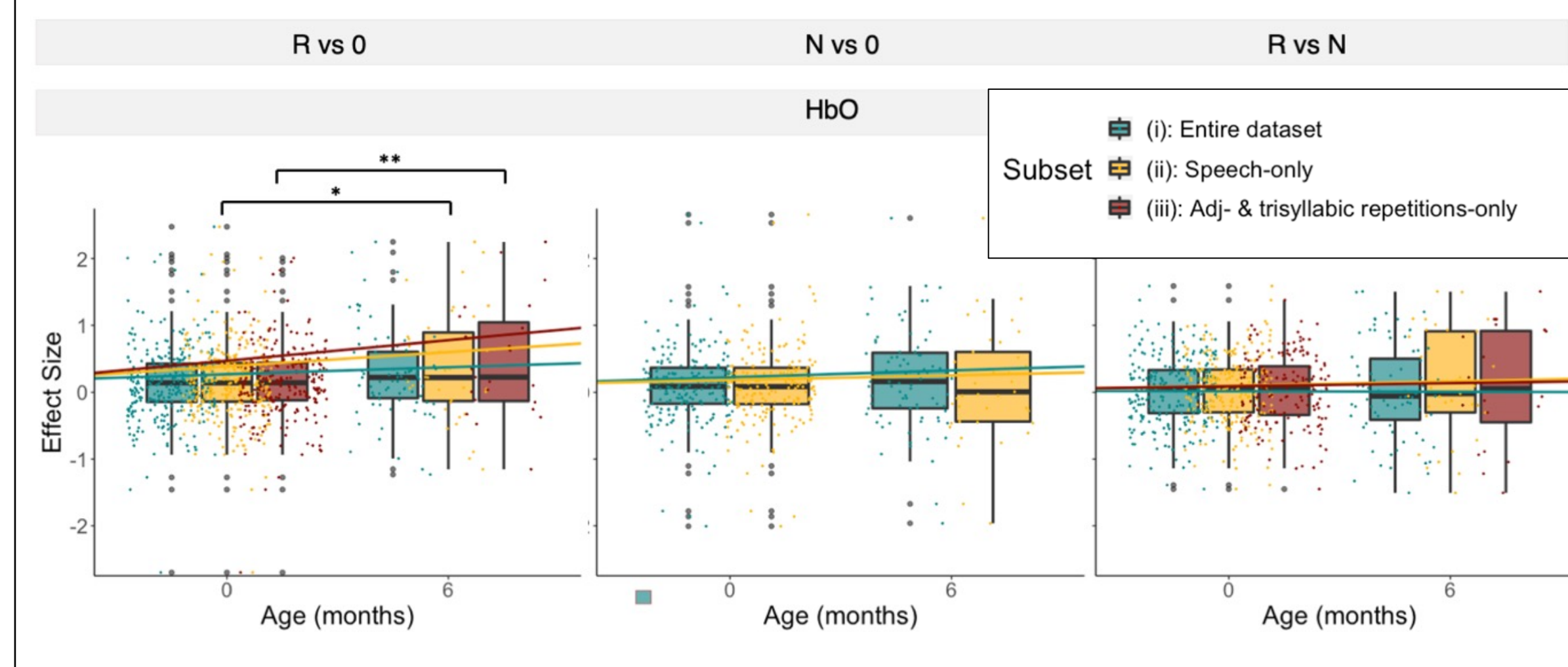
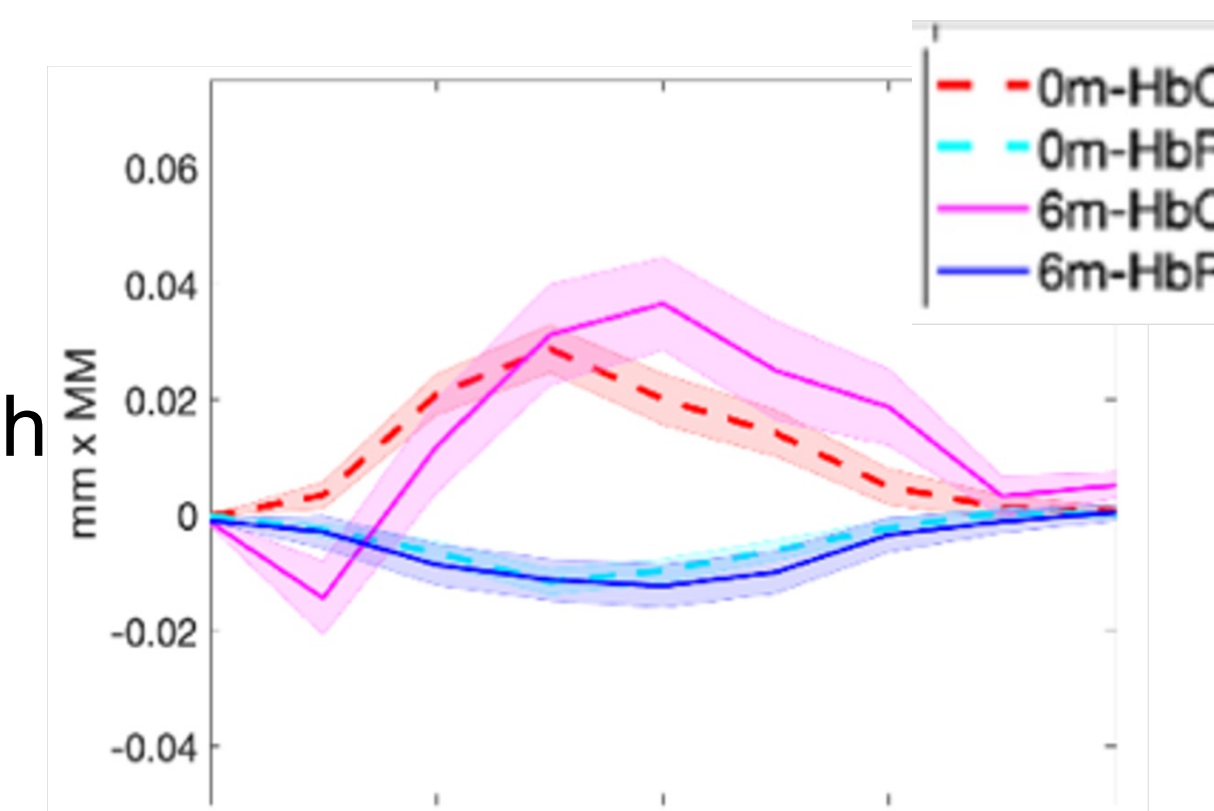
- Funnel plots
- Fail-safe N

RESULTS

In left temporal region:

R>0	d=0.27, 95% CI= [0.144, 0.398]
	0m: d= 0.27, 95% CI= [0.12, 0.42]
	6m: d= 0.29, 95% CI=[0.02, 0.56]
N>0	d= 0.18, 95% CI= [0.03, 0.33]
	0m: d= 0.14, 95% CI= [-0.05, 0.32]
	6m: d= 0.20, 95% CI= [-0.07, 0.47]
R>N	d= 0.08, 95% CI= [-0.06, 0.22]
	0m: d= 0.12, 95% CI= [-0.05, 0.29]
	6m: d= 0.04, 95% CI= [-0.24, 0.31]

- No effect of Lab
- Effect of Age In R>0 with 6m > 0m, both with HbO and HbR



CONCLUSIONS

- Factors **Study** and **Laboratory** never significant, in any of the analyses
- **Symmetric funnel plots** and **large fail-safe-N**

Effect of extracting regularities from speech in young infants is **robust and replicable** across different labs (different countries, NIRS machines, experimenters)

- Factor **Age** modulates significantly effect sizes in the left temporal area

Meta-analysis valuable tool to identify **theoretically relevant moderators** (e.g. developmental trends) and thus contribute to **stronger theory-building** on phenomenon of interest

Selected references

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