



DEVELOPMENT OF NUMBER REPRESENTATIONS IN PRESCHOOL CHILDREN

Isabel Depestel, Pol Ghesquière, & Bert Reynvoet
Contact: Isabel.Depestel@Kuleuven-kortrijk.be
Homepage: <http://www.kuleuven-kortrijk.be/~u0056447>

Faculty of Psychology and Educational Sciences
University of Leuven - Campus Kortrijk, Belgium

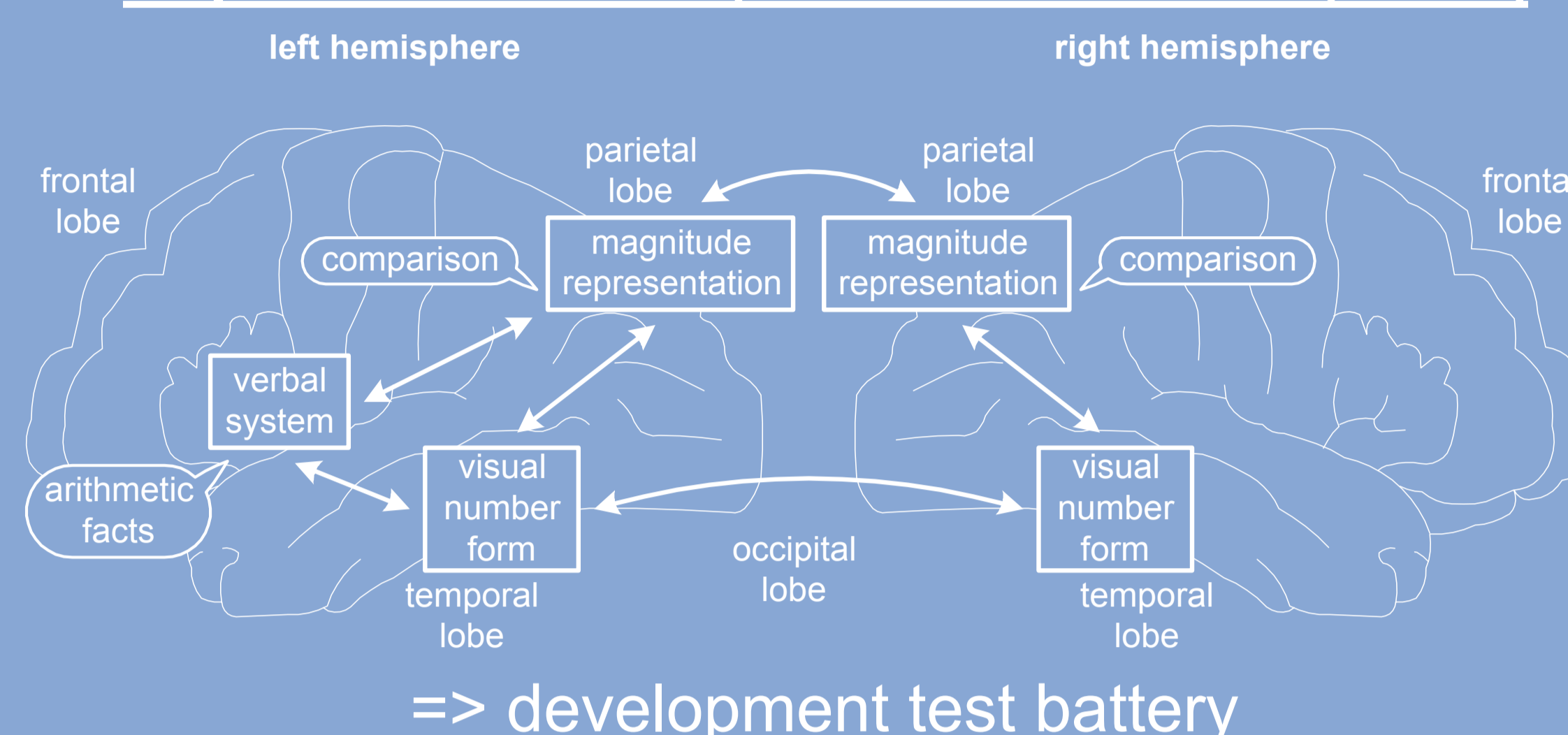
INTRODUCTION

Development of number representations typical & atypical (~ dyscalculia)

What is dyscalculia?
Is it a big problem?
What are the causes?
Is an early diagnosis possible?
...

=> 4-year follow-up study with preschoolers

Triple Code Model (Dehaene & Cohen, 1995)



=> development test battery

METHOD

Participants 6 schools; 169 children ($M = 5.7$ years, $SD = 0.50$)

Tasks

1. Verbal code

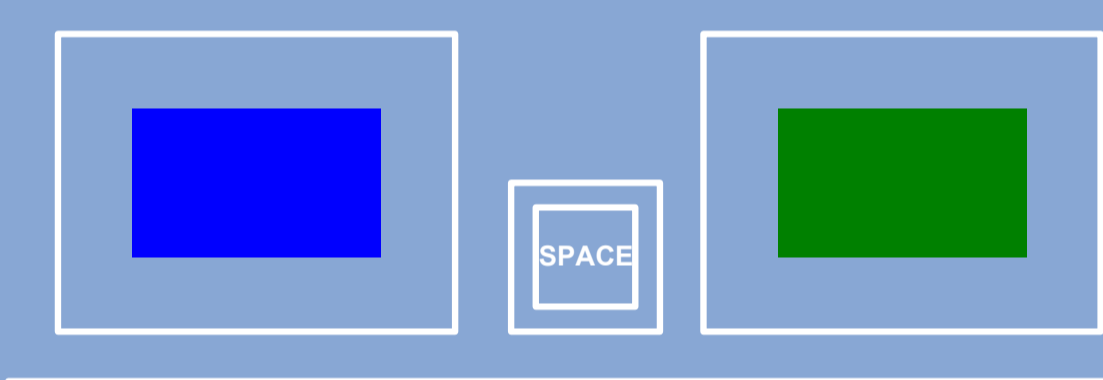
a) Color verification

~ number verification ("3 x 2 = 8 ?")
8 daily objects; verification object - color



b) Color naming

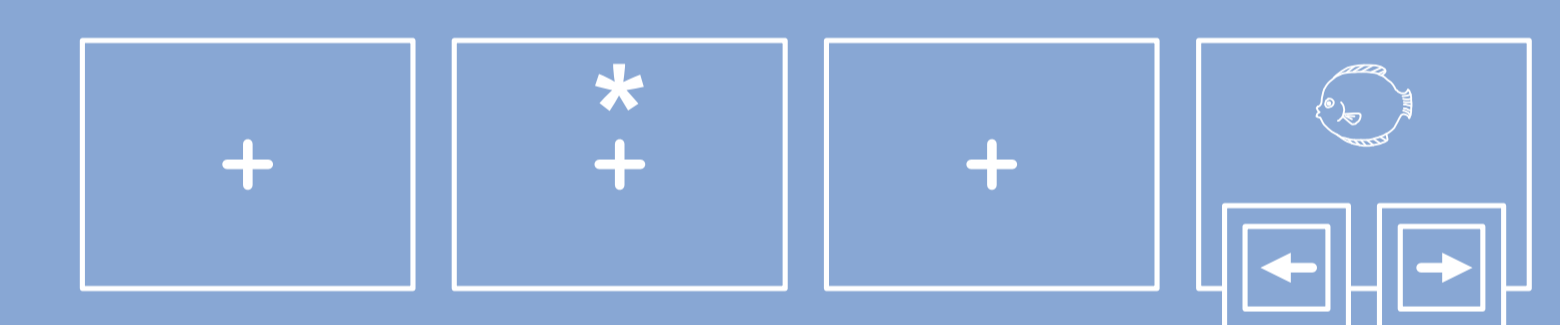
~ digit naming ("five")
4 daily colors; naming the color



2. Spatial code

Spatial attention

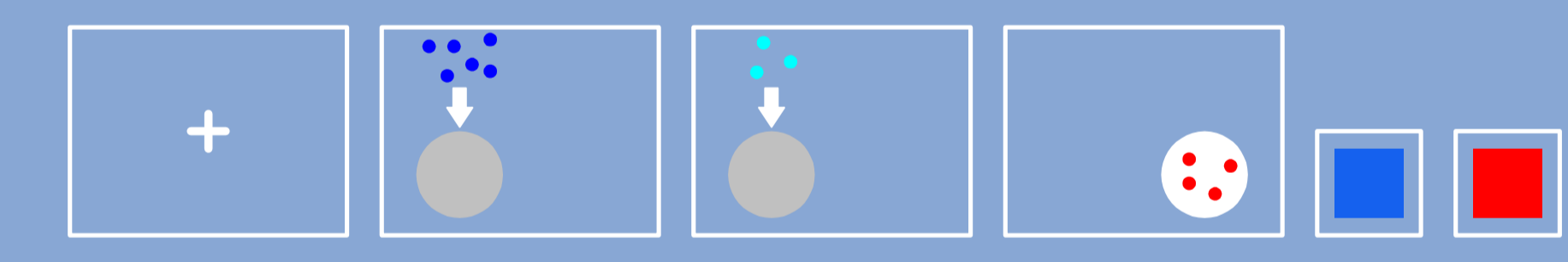
~ attention in space & on mental numberline
focus on orienting RT
central or spatial cue; deciding direction fish



3. Magnitude code

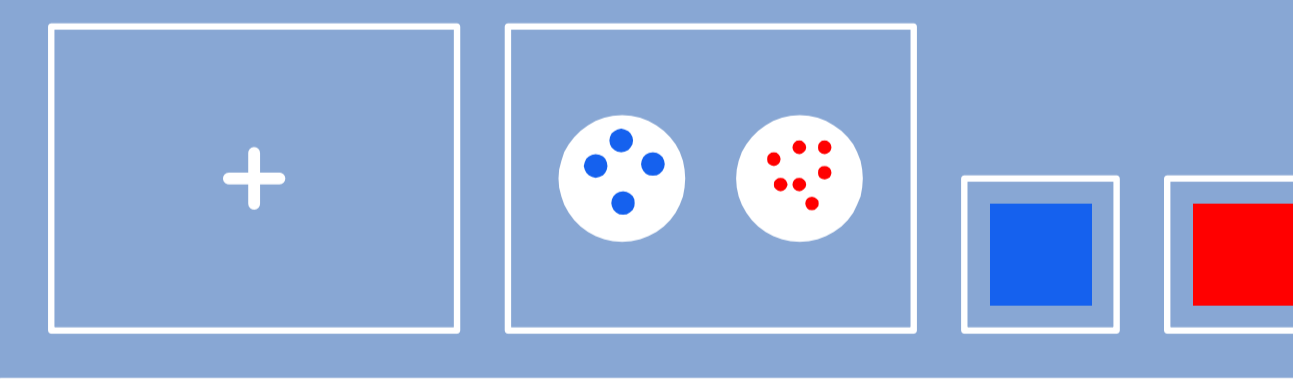
a) Dot addition

~ number addition
4 ratios (1.25, 1.5, 1.75, 2), each presented
4 times; adding two amounts and comparing



b) Dot comparison

~ number comparison
4 ratios (1.25, 1.5, 1.75, 2), each presented
4 times; comparing two amounts



RESULTS

Verbal code

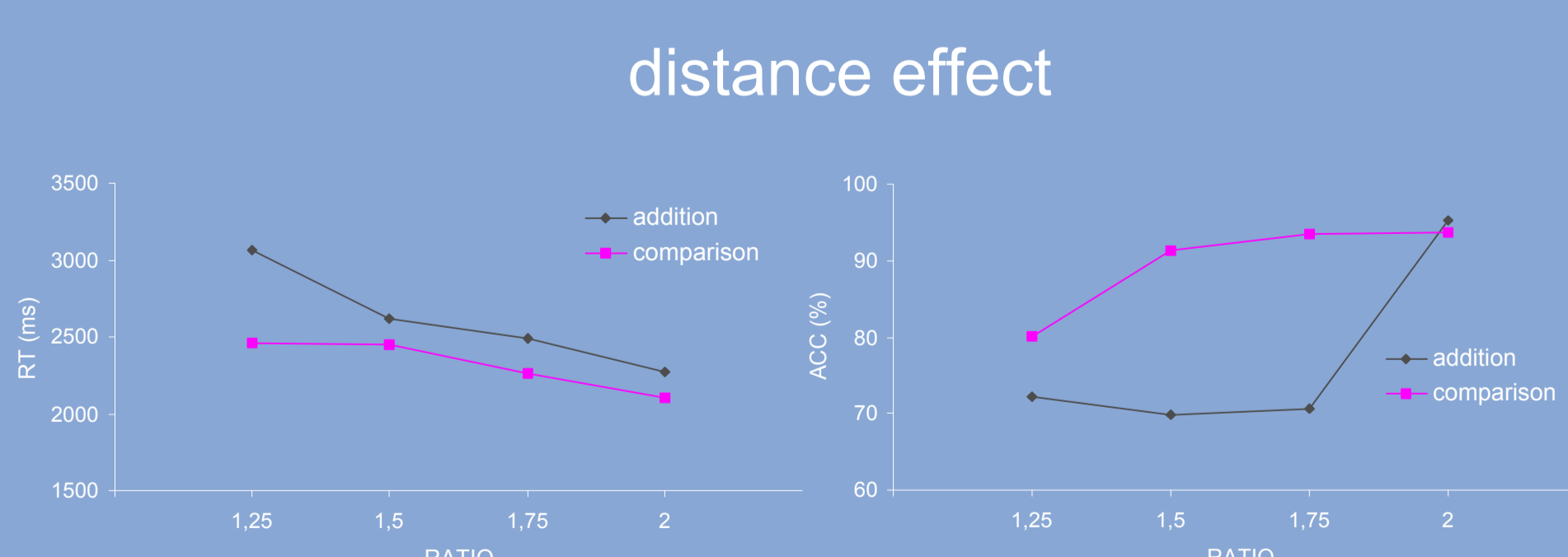
RT color verification > color naming
ACC color verification < color naming

Magnitude code

RT dot addition > dot comparison
ACC dot addition < dot comparison

Spatial code

Advantage spatial cue
RT spatial cue < central cue
ACC spatial cue > central cue



CONCLUSION

Can dyscalculia be predicted at a young age?

The development of this test battery, which shows classical number effects, provides a first step into revealing this exciting question.

Future research will show if this test battery can be used as a reliable predictor.

FURTHER WORK

1. Relation test battery - arithmetic tasks SiBO research & control variables
2. Follow-up preschoolers in 1st, 2nd, and 3rd grade
3. fMRI investigation of the neurological basis of differences in typical - atypical development in number representations with young adults

REFERENCE

Dehaene, S., & Cohen, L. (1995). Towards an anatomical and functional model of number processing. *Mathematical Cognition*, 1, 83-120.