



Psychologie en Pedagogische Wetenschappen

Building blocks of mathematics performance

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Brain & Cognition – www.numcogableuven.be

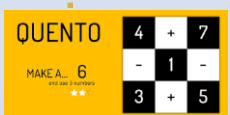
BACKGROUND

The frequency of home numeracy activities parents did with their children was predictive for children's **symbolic number processing**

EXPLANATION

Attentional control theory:

“When being confronted with math-related content, MA evokes worrying thoughts, leading to attentional biases: distracting the attention away from the task at hand and/or a failure to inhibit attention to these worrying thoughts” = general deficit in **Cognitive Control**



Pilot training study with app in 11 year old children reduced MA and improved math ability after 3 weeks of training

- Socio-economic status of the family
- Home numeracy activities

TRAIN COGNITIVE CONTROL

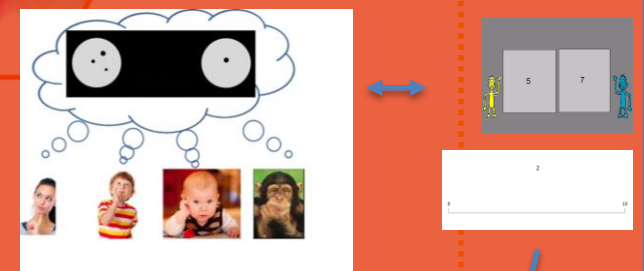


- Math anxiety
- Math self-concept

- General intelligence
- Working memory capacity
- Attention
- Cognitive control

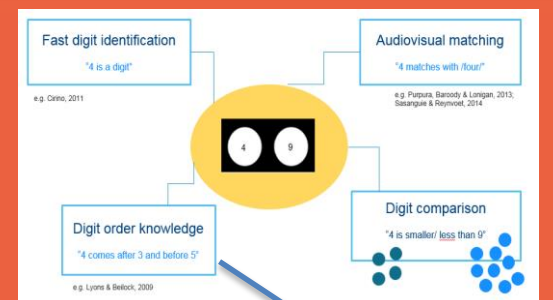
- Basic numerical skills: comparing numbers, making estimations, ordering numbers,

UNDERSTANDING



2 different systems for processing symbolic and nonsymbolic numbers in the brain

Symbolic processing is most predictive for math performance – especially comparison: why?



Relation symbolic comparison and math totally mediated by ordering ability

	Ascending	Descending	Non-order
Ascending trials			
Descending trials	.90		
Non-order trials	.88	.85	
TTR	-.43	-.45	-.52

Performance on non-order trials correlate strongest with math: why?

Cognitive control is needed to overcome interference of ordered sequence

TRAINING

CHILDREN



Effectiveness of training with comparison and number line is similar in 5-6 year olds who played 1h spread over 3 weeks

ADULTS

TRAINING WITH NON-SYMBOLIC COMPARISON TASK



Training/learning only on incongruent trials: why?

Incongruent trials reflect Cognitive Control

TRAIN COGNITIVE CONTROL