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## Background:

- Recognizing and **processing of hierarchies** plays a role in different domains, e.g. language (Marcus, 2006), action (e.g., Botvinick, 2008; Koechlin & Jubault, 2005; Miller, Galanter & Pribram, 1976) and music (Koelsch et al., 2013)
- Processing of hierarchical structures with nested nonlocal dependencies could be a **multidomain capacity** of human cognition (Koelsch et al., 2013)

## Aim of the study:

- Nest understanding: single- or multidomain capacity?
- Relations to ToM and other hierarchical measurements?

## Method:

### Sample

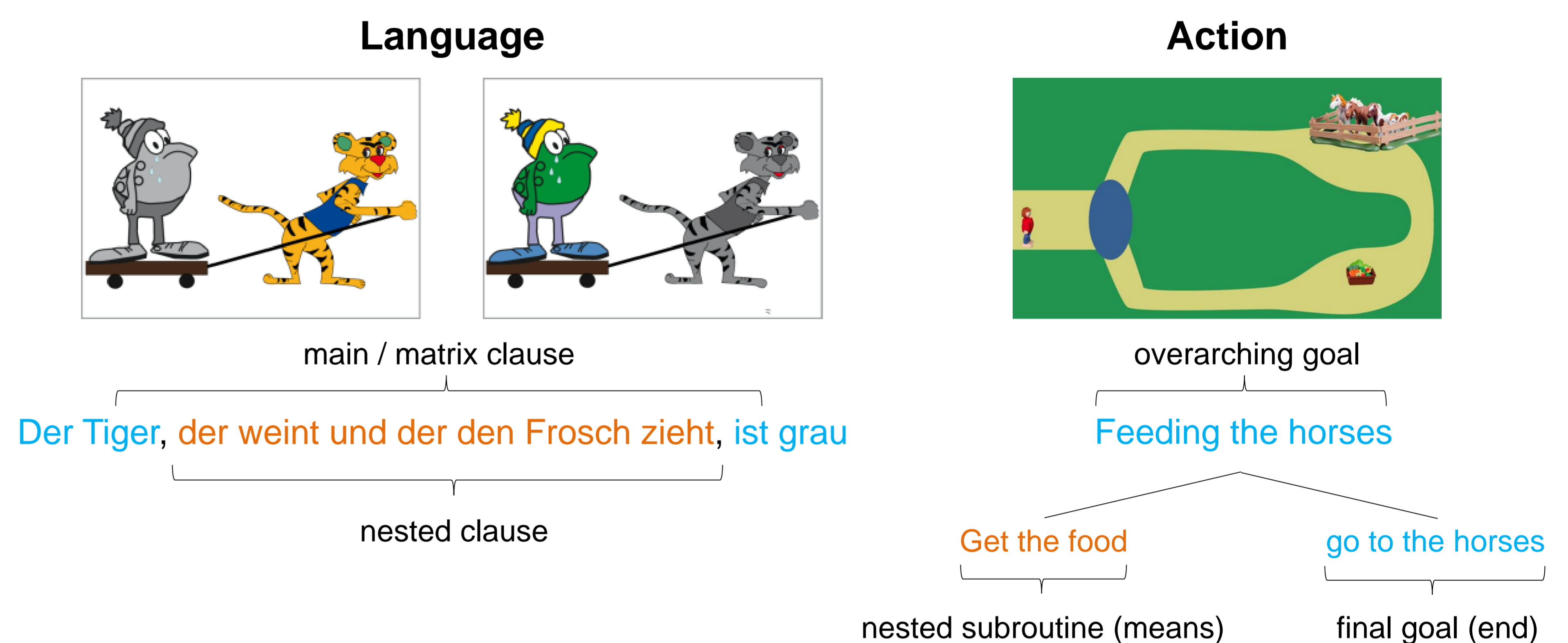
- 3.5 – 6.5 years old children

### Main tasks

- Action: Path paradigm (pointing)
- Language: Picture matching (button press)

### Further variables

- ToM (Contents & Explicit False-Belief)
- Tree complexity
- Working memory (digit span forward)
- Inhibitory control (Day & Night)



## Study 1: Simple vs nested actions

### Scores in simple and nested condition

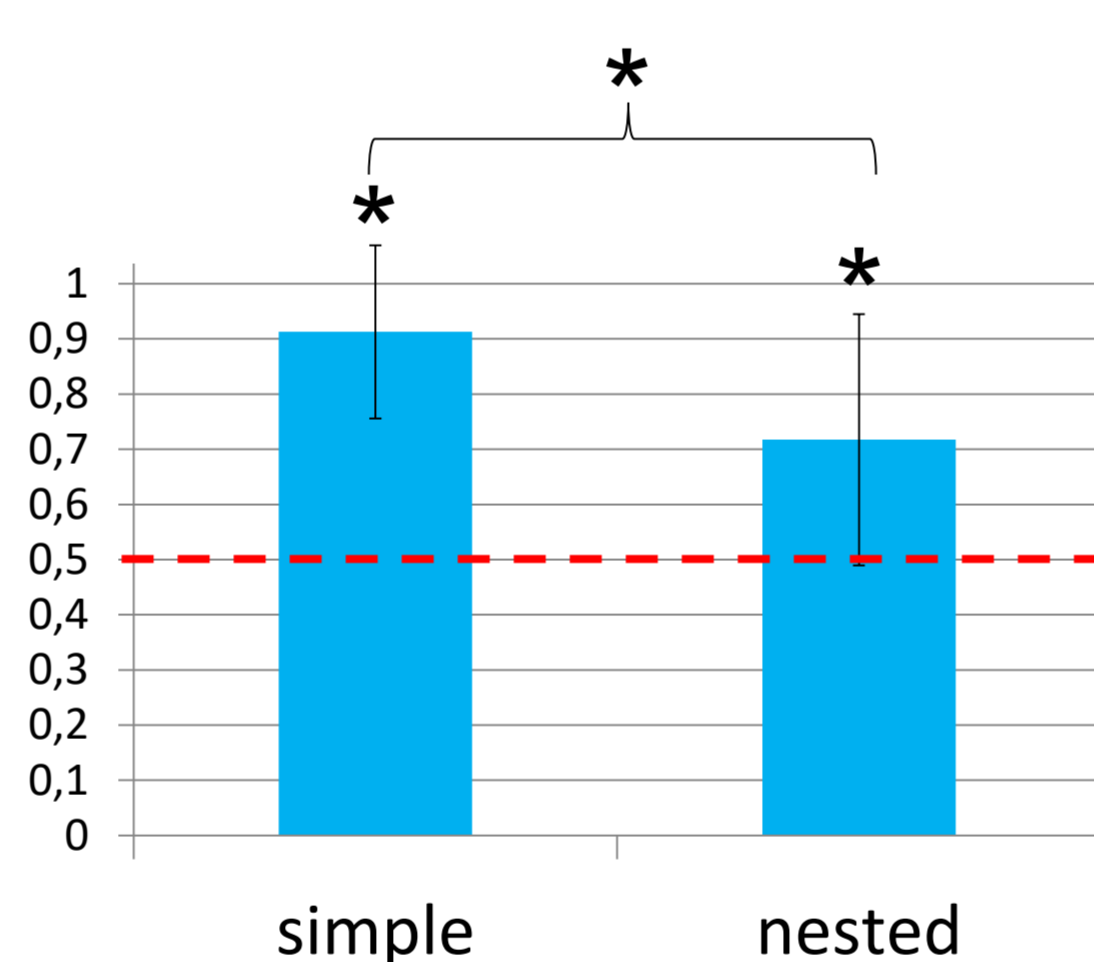
$N=86$ , age range: 37-79 months ( $M=55.91$ )

### Higher performance in simple actions:

- $t(85) = 6.47, p < .001$

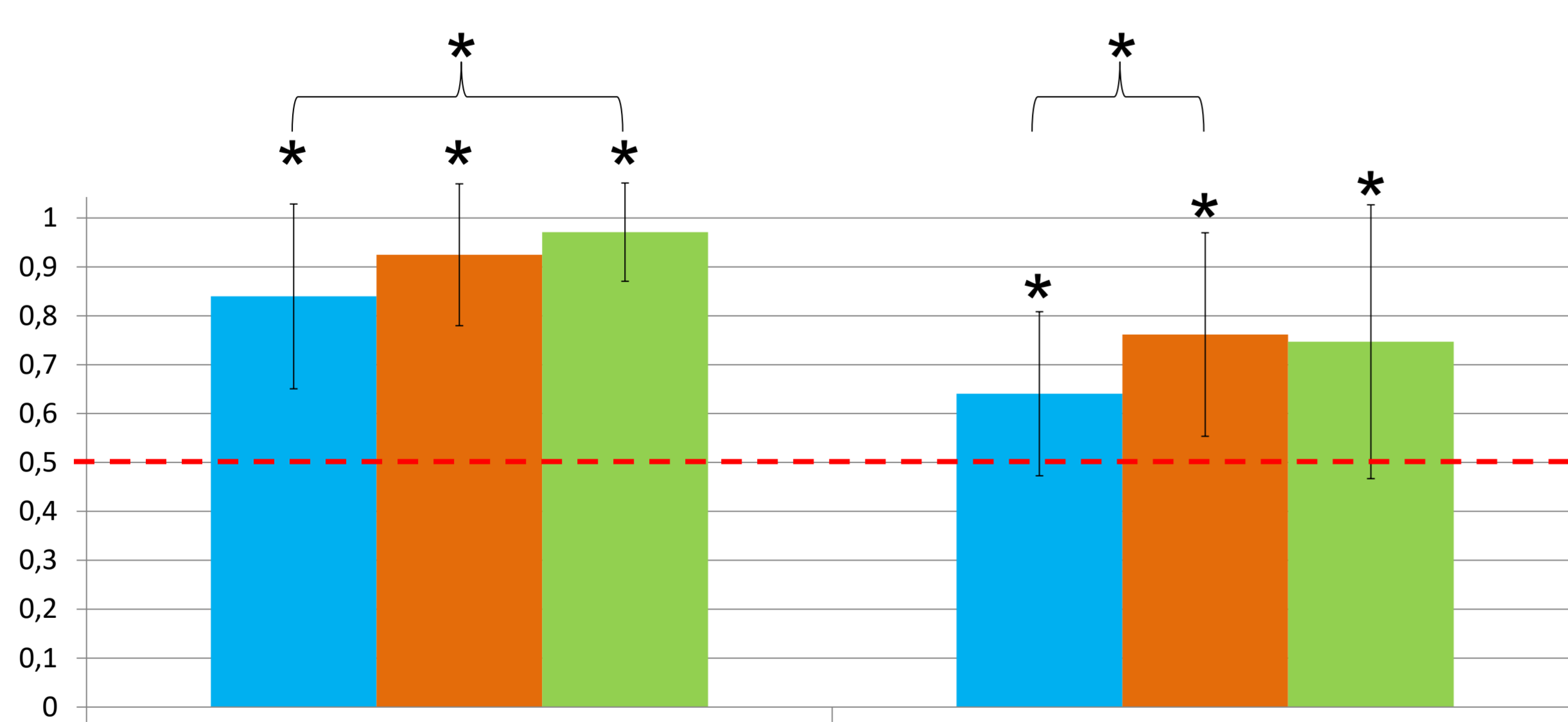
### Above chance performance

- Simple:  $t(85) = 24.40, p < .001$
- Nested:  $t(85) = 8.83, p < .001$



### Correlational analysis

	Age
Simple	$r_s = 0.364^{**} (p < .001)$
Nested	$r_s = 0.290^{**} (p = .007)$



- younger ( $N=28$ , range: 37-47 months,  $M=42.54$ ,  $SD=3.17$ )
- middle ( $N=29$ , range: 48-60 months,  $M=54.9$ ,  $SD=4.12$ )
- older ( $N=29$ , range: 61-79 months,  $M=69.83$ ,  $SD=5.24$ )

## Study 2: Preliminary results correlation study

$N=41$ , age range: 38-79 months ( $M=55.71$ )

	Age	Action simple	Action nested	Language simple	Language nested	Language double nested	Tree Complexity	Working Memory	ToM Contents & Explicit FB
Action simple	.476**								
Action nested	.132	.197							
Lang. simple	.285	.107	-.156						
Lang. nested	.443**	.087	-.094	.514**					
Lang. double	.442**	.069	-.214	.490**	.460**				
Tree	.681**	.529**	.118	.211	.160	.287			
WM	.569**	.192	.081	.329*	.454**	.298	.524**		
ToM	.442**	.244	.184	.221	.442**	.335*	.413**	.411**	
Day & Night	.302	.041	-.129	.181	.259	.321*	.328*	.271	.159

## Discussion of preliminary results:

- No correlation between nest understanding in language and action
- Relation of language nest understanding to ToM and working memory

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