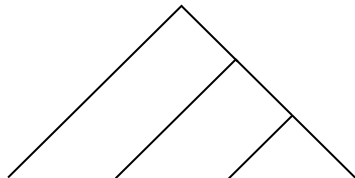
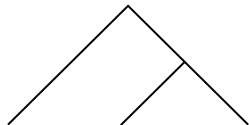
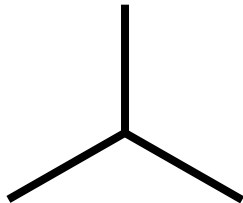
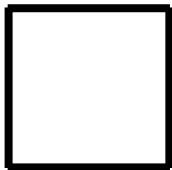


Sablé-Meyer et al. (2022) found that adults' reaction times and error rates in match-to-sample tasks were **predicted by the minimum description length (MDL)** of the shape's LOT program

This **fuses two features of geometric shape representations** that are partly independent, format (LOT) and selection (MDL), and uses MDL data to argue for LOT—Highly indirect evidence

We report more **direct evidence for tree structure in geometric shape representations** from three online experiments with adults

trace
segment



repeat
4 times **trace**
segment **turn**
90°

repeat
3 times **execute**
& **return** **trace**
segment **turn**
120°



Different structured representations can be induced for the same shape

Samples

Targets

Shape

Structure

Matches

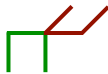
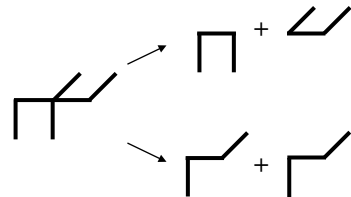
Deviants

Congruent

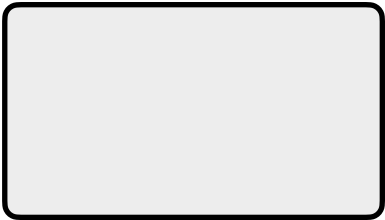
Incongruent

Modified
congruent

Modified
incongruent



Experiment 1: Structural Ambiguity



Background

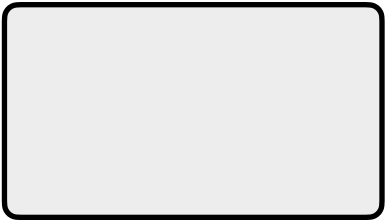
We build on the recent proposal that **geometric shapes are represented in a language of thought (LOT) consisting of a handful of primitives that combine to recreate the encoded shape** (Sablé-Meyer et al. 2022)

Subparts are easier to recognize when they belong to the same subtree

Experiment 2: Subtree Facilitation































Experiment 3: Movement Depth

Shapes are easier to reconfigure when they
are split higher up in the tree



Samples

Targets

Shape	Structure	Overlap	Matches				Deviants	
			Same subtree	Different subtrees			Rotated same	Rotated different
	 + 							
	 + 							
	 + 							
	 + 							

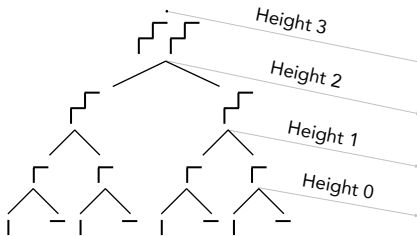


Samples

Shape



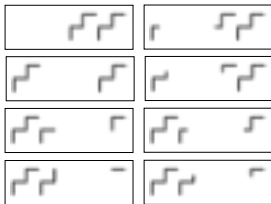
Structure



Targets

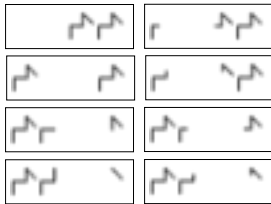
Matches

Tree preserved Tree broken

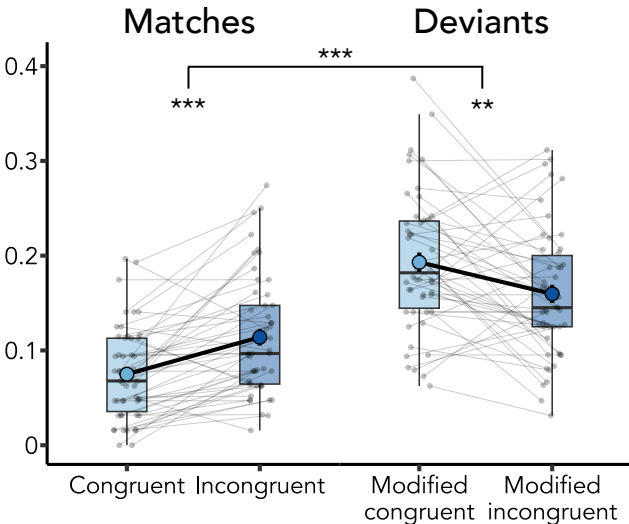


Deviants

Tree preserved Tree broken



Error rates



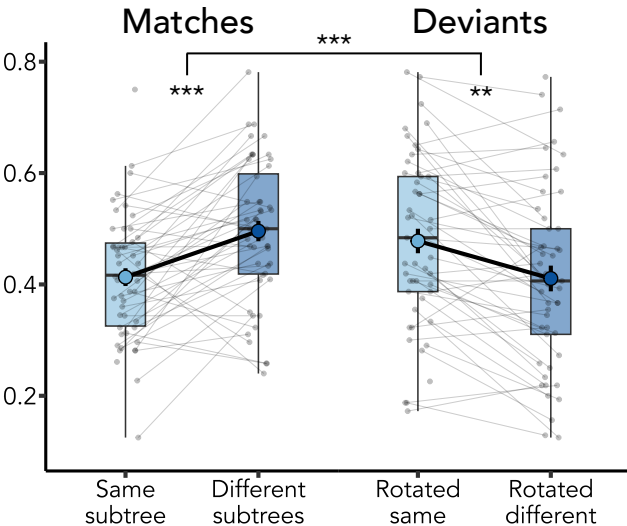
50 subjects

16 shapes

256 trials

Within-subjects

Error rates



50 subjects

16 shapes

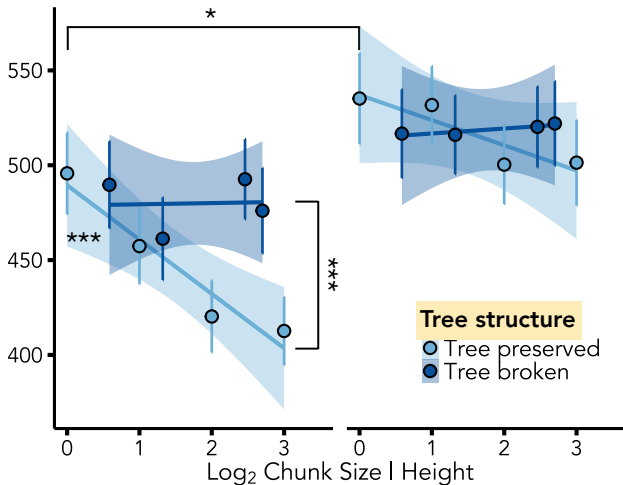
128 trials

Within-subjects

Reaction times

Matches

Deviants



36 subjects

8 shapes

256 trials

Within-subjects

**Geometric shape representations in human adults
have syntactic structure**



Fyssen



Cerec



NeuroSpin

cea

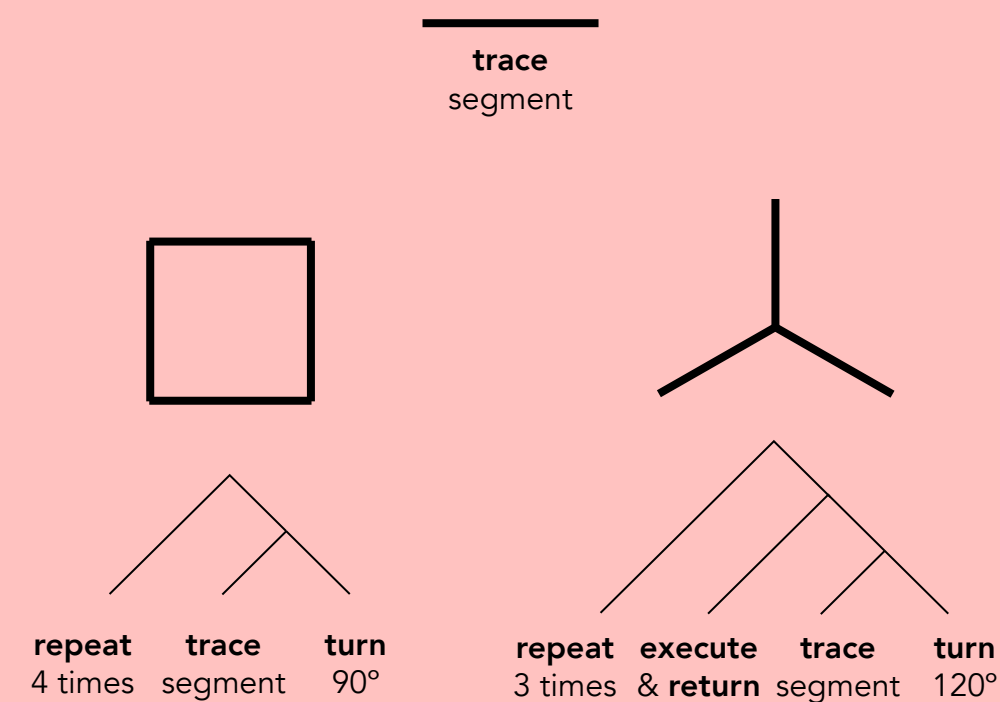
Inserm

Barbu Revençu and Stanislas Dehaene

NeuroSpin Cognitive Neuroimaging Unit | CEA | INSERM | Université Paris-Saclay

Background

We build on the recent proposal that geometric shapes are represented in a language of thought (LOT) consisting of a handful of primitives that combine to recreate the encoded shape (Sablé-Meyer et al. 2022)



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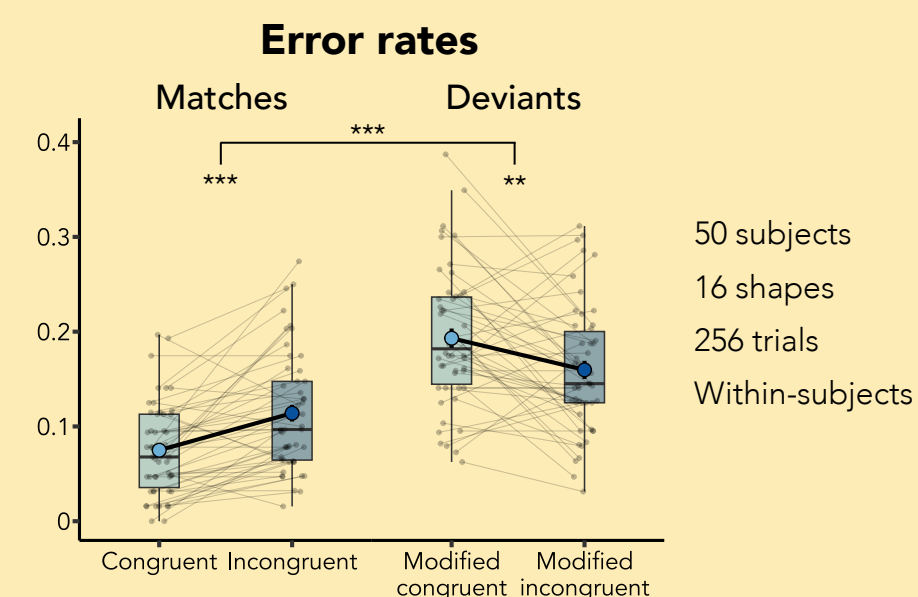
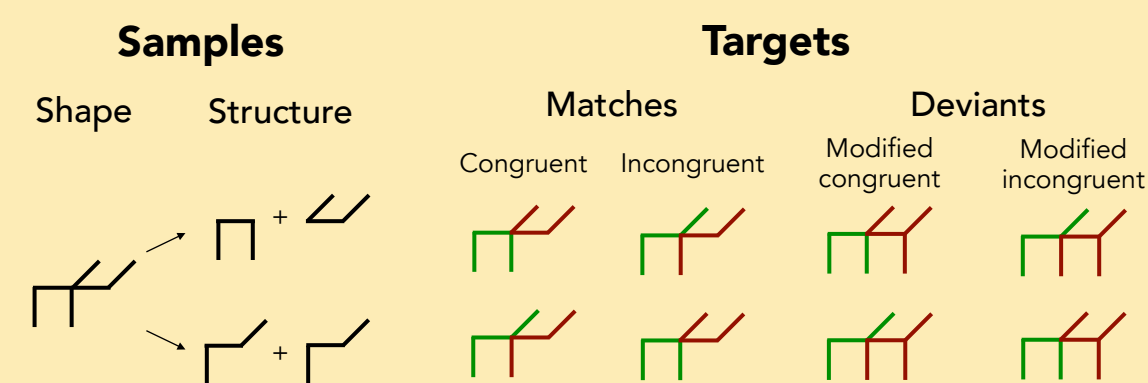
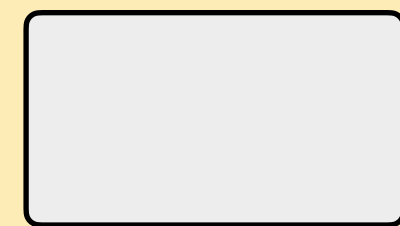
Geometric shape representations in human adults have syntactic structure

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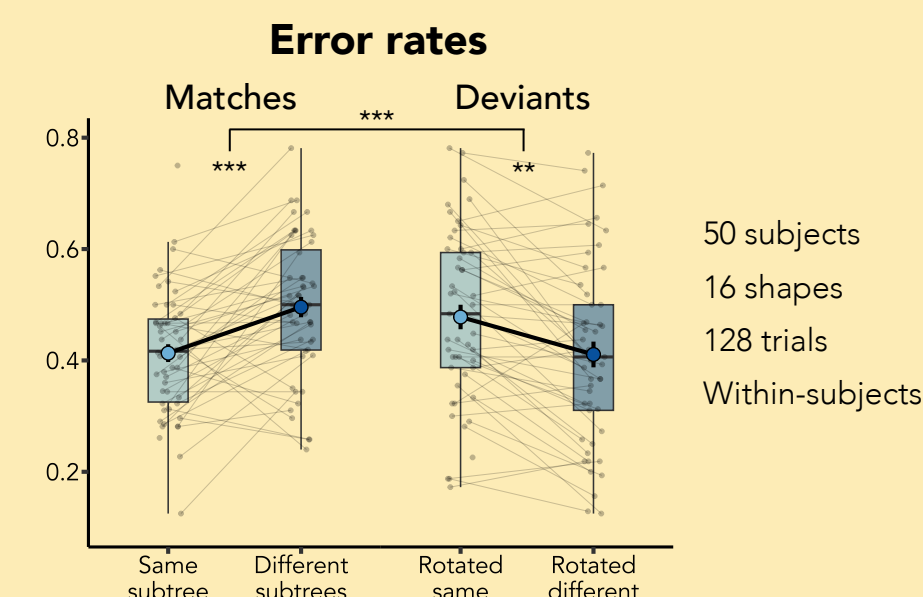
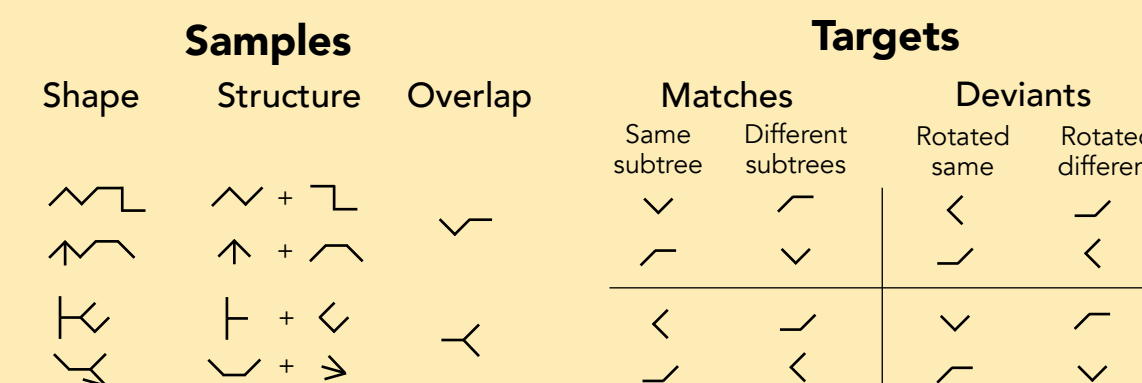
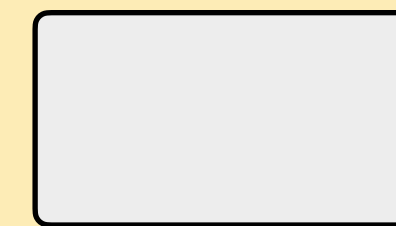
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