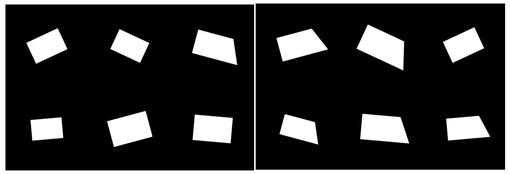
Sensitivity to geometric shape regularity in humans and baboons: *A putative signature of human singularity*

PRESENTER:
Mathias Sablé-Meyer

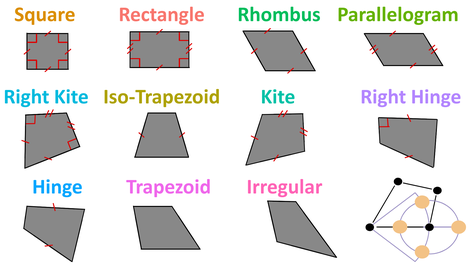
Determining the cognitive differences between human and other primates is a goal of cognitive science. We show that intuitions of geometry are present in all humans, but absent in baboons.

METHODS

- Intruder task (1 in 6) on geometrical shapes

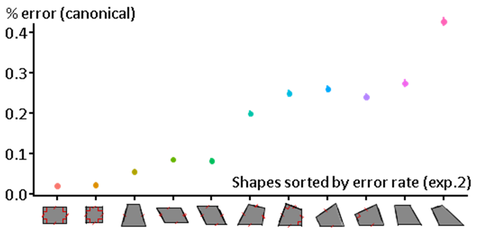


- 11 shapes of graded complexity

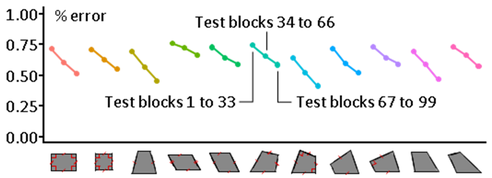


RESULTS

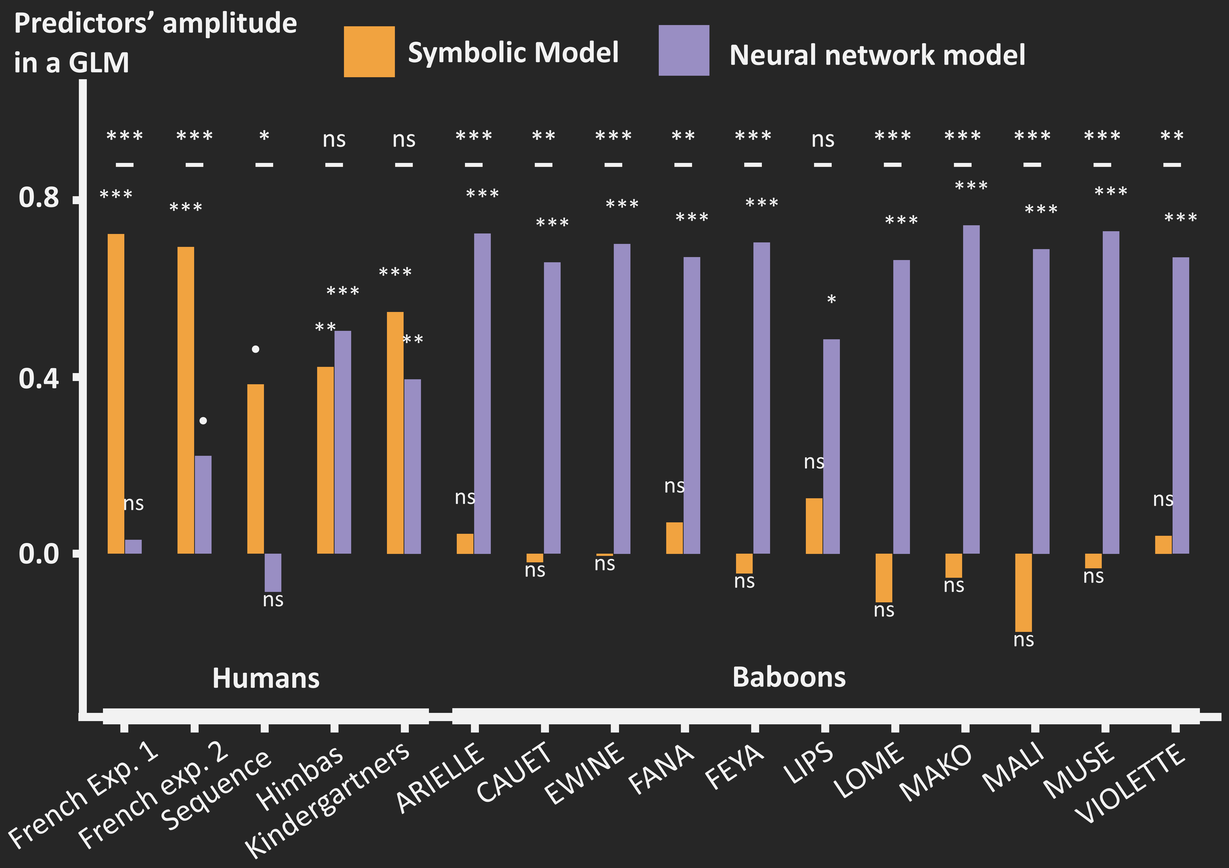
- Replicated with 605+117 French adults, 28 kindergartners, and 22 uneducated adults

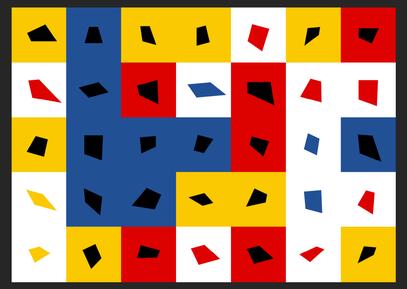


- Not replicated with baboons despite training



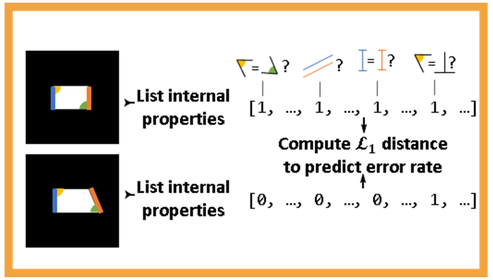
A geometrical intruder task shows a pattern of performance present in **all humans, regardless of age, education and culture,** but **absent in baboons**. Neural networks model baboons, but symbols are required to model humans.

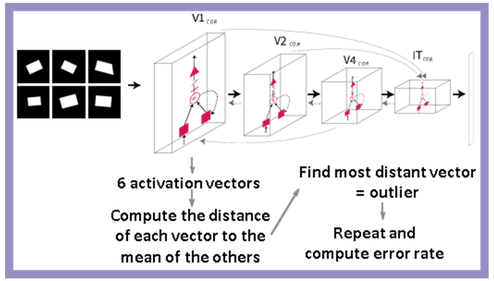




Additional results and details

WHAT ARE THE TWO MODELS?





ARE OTHER NEURAL NETWORKS BETTER?

- Not CORnet, ResNet, or (vq-)VAEs
- Training doesn't help either

DOES ANY SHAPE POP-OUT?

- Visual search results says no: search time increases with the "complexity" of the shape, but all of them require effort and attention

DO BABOONS UNDERSTAND THE TASK?

- They were trained successfully on a 1st set of stimuli, then generalized almost immediately to new stimuli, and yet they (i) fell back to chance on geometrical shapes, and (ii) even when they progressed, the pattern of error didn't match that of humans

Mathias Sablé-Meyer, Joël Fagot, Serge Caparos, Timo van Kerkoerle, Marie Amalric, and **Stanislas Dehaene**

UNICOG
Cognitive Neuroimaging Lab