

# Hippocampal functions modulate transfer-appropriate cortical representations supporting subsequent memory

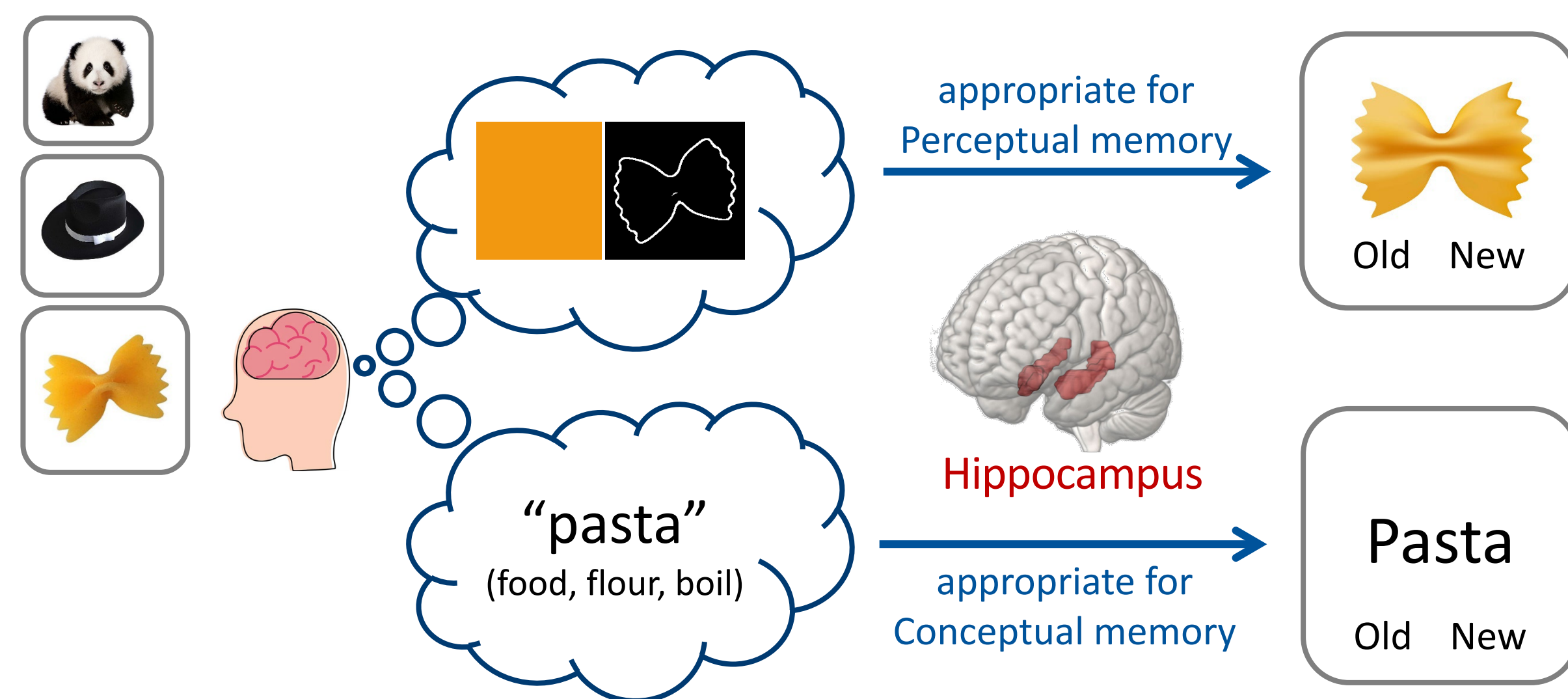


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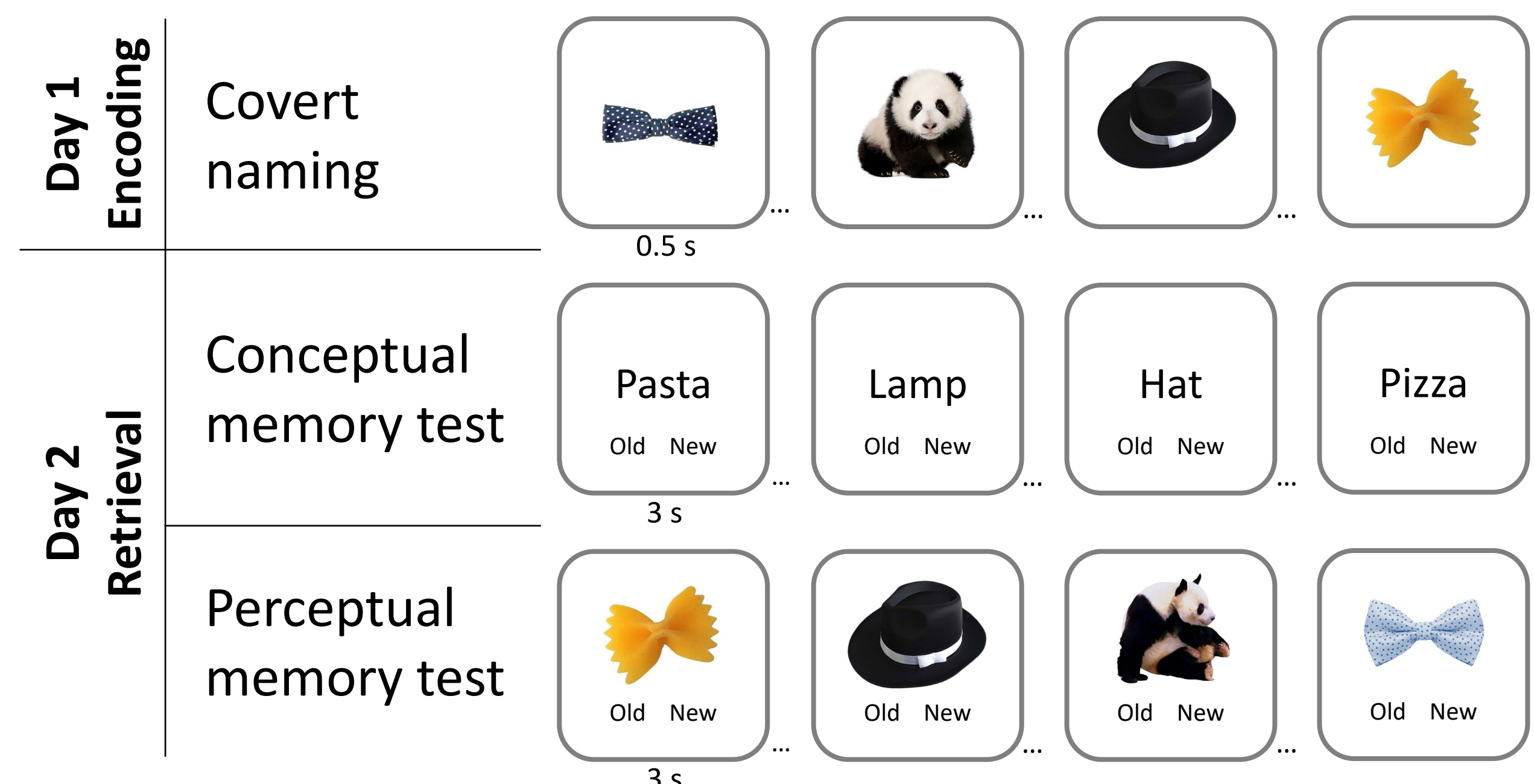
## 1. Transfer-Appropriate Representations



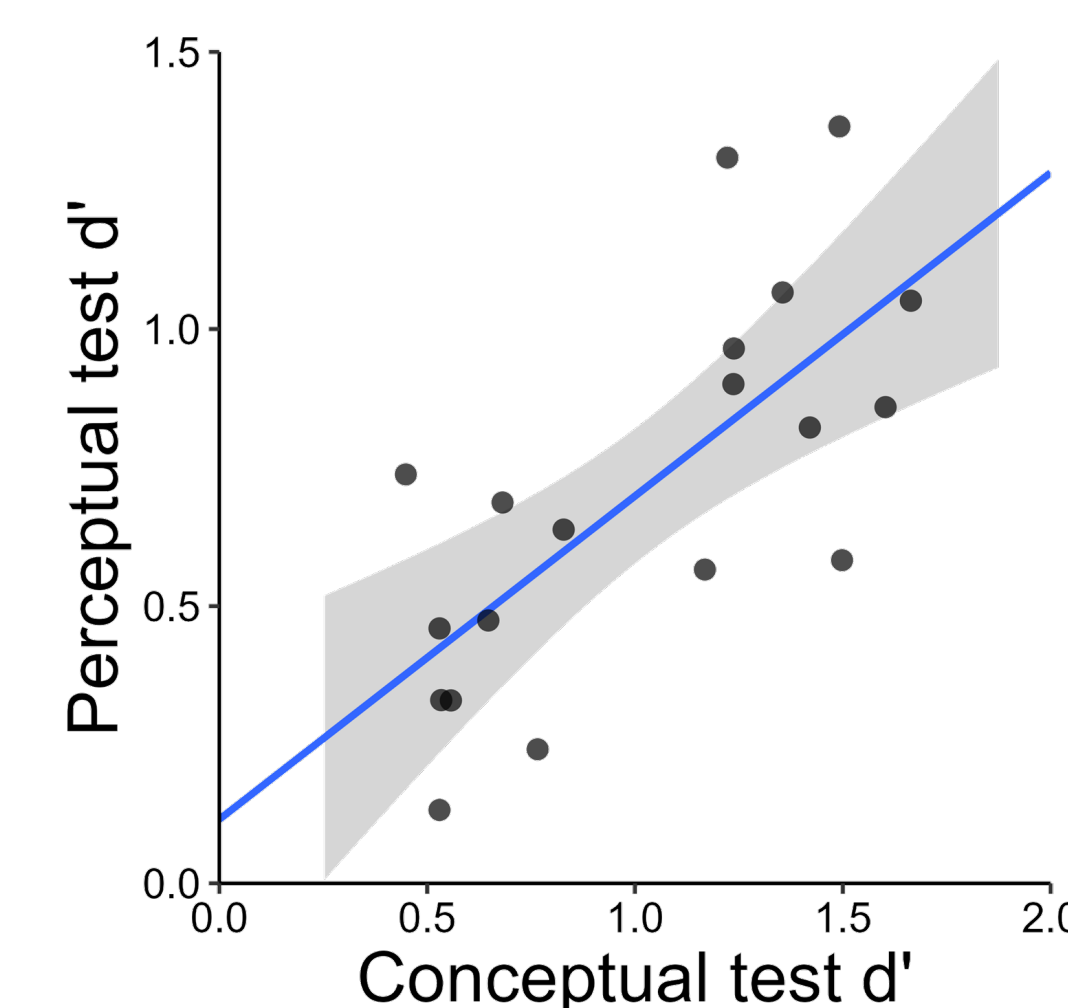
- Transfer-appropriate processing: matching cognitive operations during encoding and retrieval improve memory.<sup>1</sup>
- Encoding representations of **visual** and **semantic** properties may selectively support **perceptual** and **conceptual** memory, respectively.
- The hippocampus may be agnostic to stimulus properties,<sup>2,3</sup> yet it may modulate the mnemonic effect of cortical representations.

## 2. Experimental Design

N = 19, 7 females, age = 23.08 ± 2.73, native English speakers

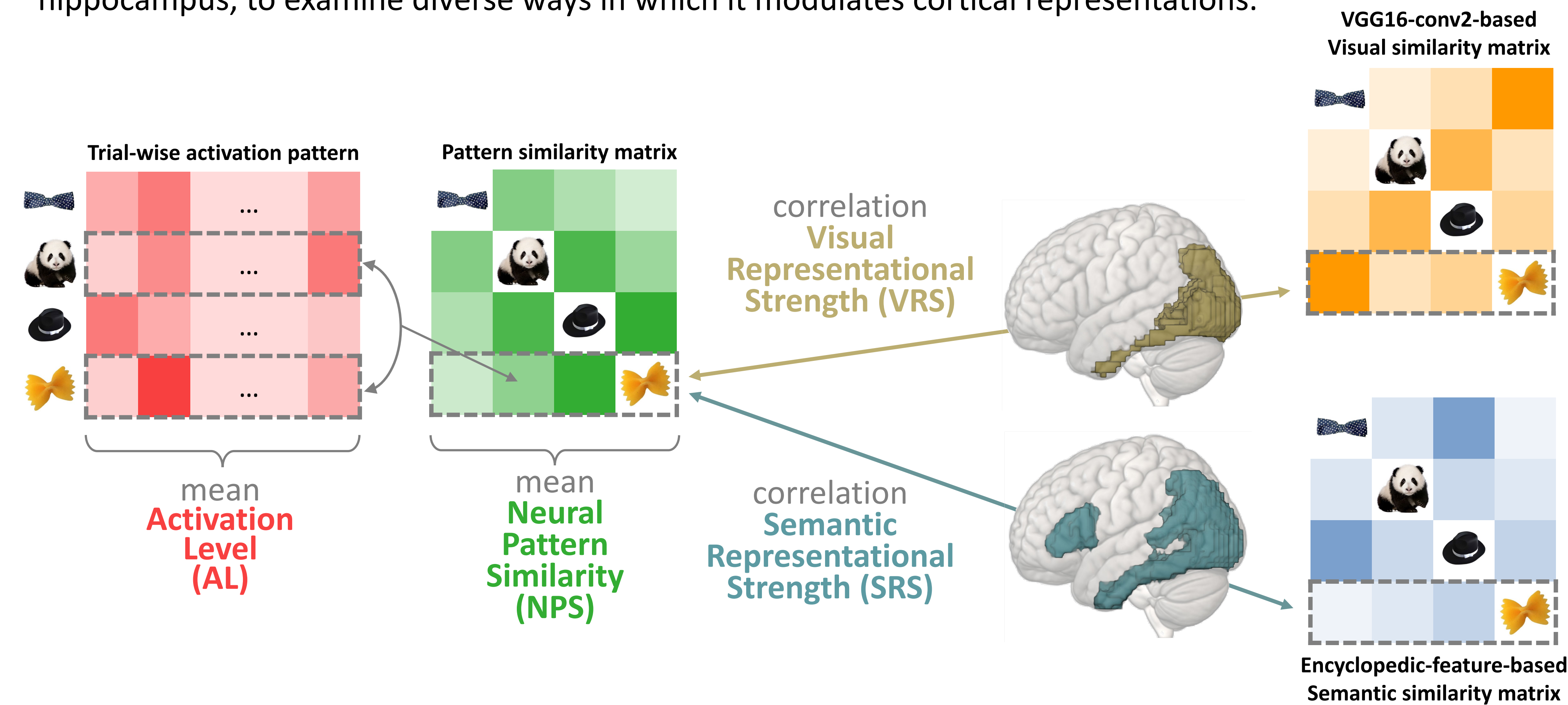


Individual sensitivity ( $d'$ ) to Old/New concepts and images are positively correlated ( $r = 0.72, p < .001$ ).



## 3. Activation Level, Neural Pattern Similarity, Representational Strengths

- We computed representational strengths (RS, **visual** and **semantic**)<sup>4</sup> for Brainnetome brain regions.<sup>5</sup>
- We additionally computed item-wise **Activation Level (AL)** and **Neural Pattern Similarity (NPS)** for the hippocampus, to examine diverse ways in which it modulates cortical representations.



## 5. Discussion

- Cortical regions, but not the hippocampus, robustly represent visual and semantic information of everyday objects.
- Hippocampal functions modulated the mnemonic impact of cortical representations that are **transfer-appropriate**.
- No evidence for **transfer-incongruent** hippocampal-cortical interactions supporting subsequent memory.
- Future studies may evaluate the impact of other non-representational regions, such as prefrontal control regions<sup>6</sup> on episodic memory.

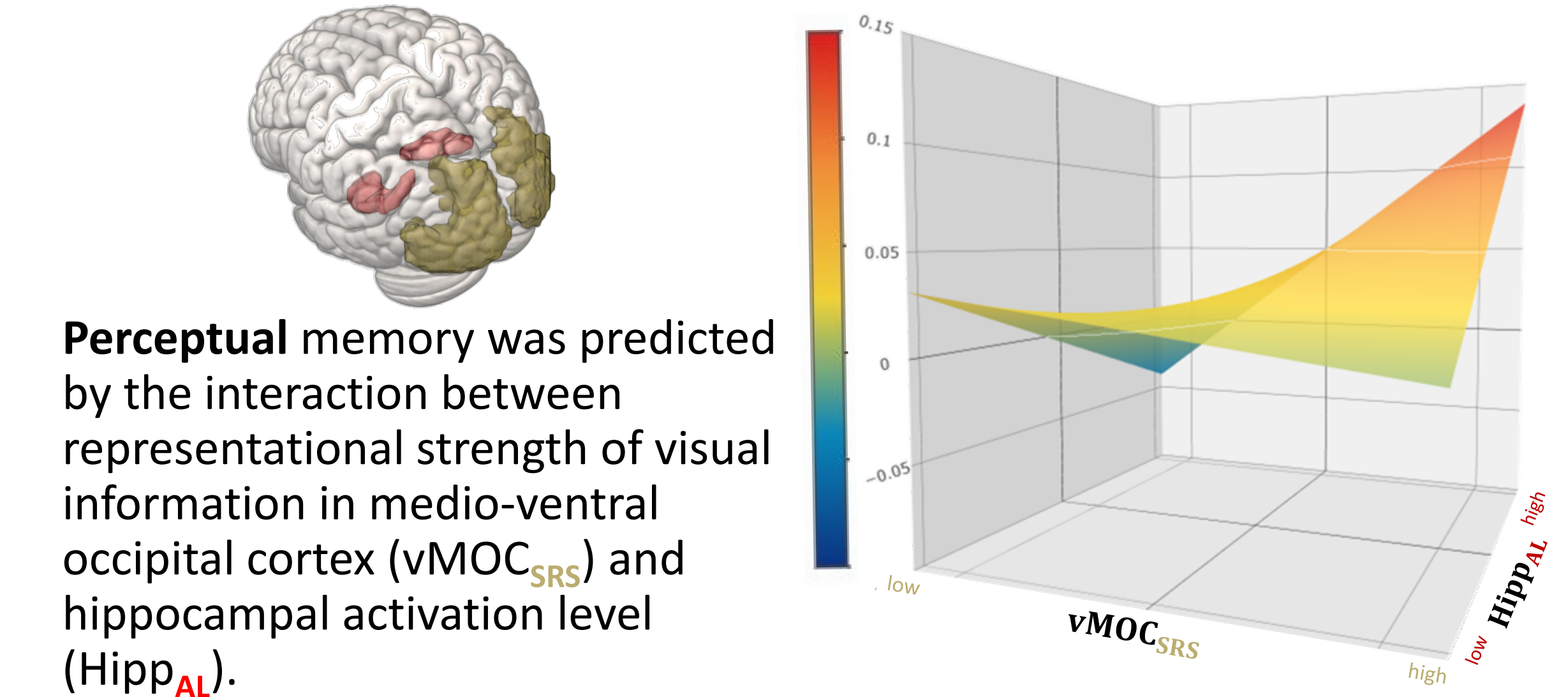
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## 4. Hippocampal-cortical interactions

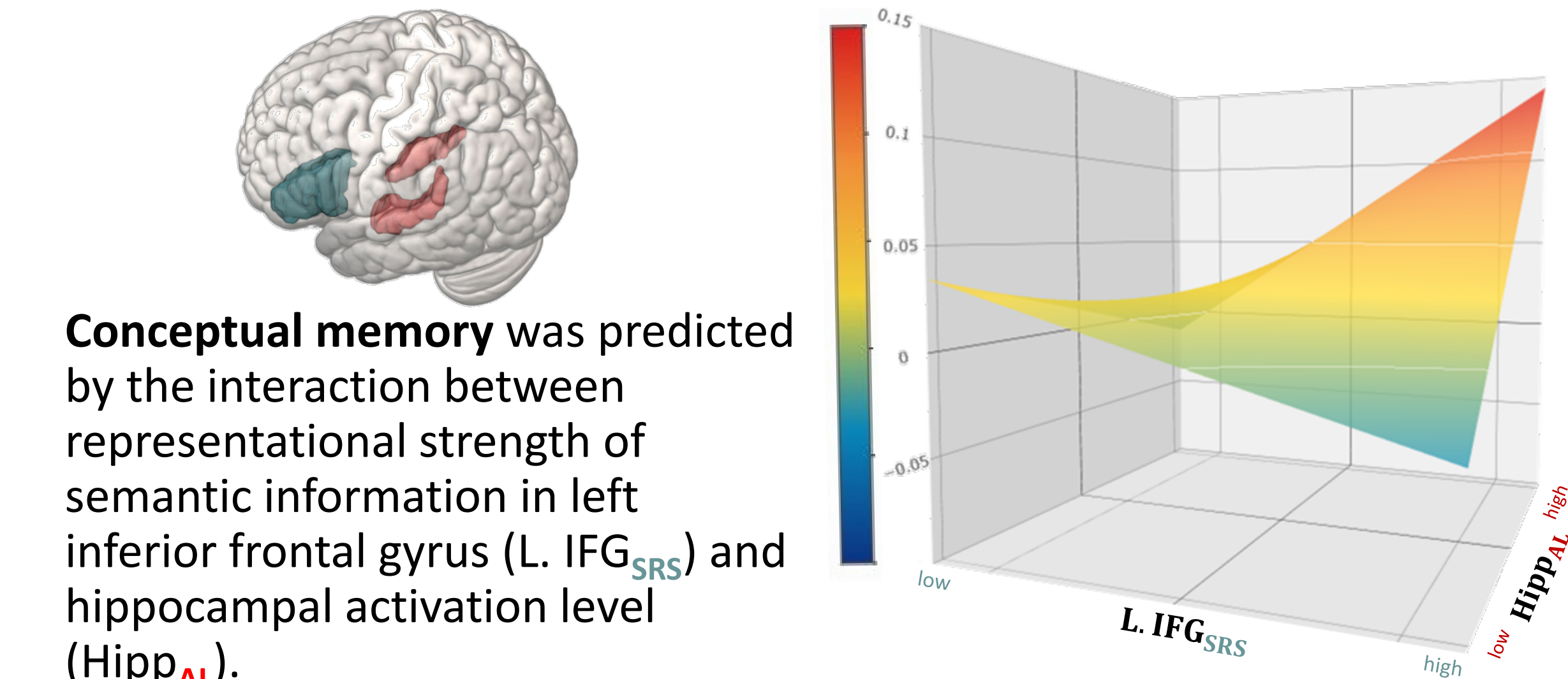
### Transfer-appropriate models

$$\text{Perceptual memory} \sim (\text{Cort}_{\text{VRS}} * \text{Hipp}_{\text{AL}}) + (\text{Cort}_{\text{VRS}} * \text{Hipp}_{\text{NPS}}) + (\text{Cort}_{\text{VRS}} * \text{Hipp}_{\text{VRS}})$$



**Perceptual memory** was predicted by the interaction between representational strength of visual information in medio-ventral occipital cortex (vMOC<sub>SRS</sub>) and hippocampal activation level (Hipp<sub>AL</sub>).

$$\text{Conceptual memory} \sim (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{AL}}) + (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{NPS}}) + (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{SRS}})$$



**Conceptual memory** was predicted by the interaction between representational strength of semantic information in left inferior frontal gyrus (L\_IFG<sub>SRS</sub>) and hippocampal activation level (Hipp<sub>AL</sub>).

### Transfer-incongruent models

$$\text{Perceptual memory} \sim (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{AL}}) + (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{NPS}}) + (\text{Cort}_{\text{SRS}} * \text{Hipp}_{\text{SRS}})$$

Perceptual memory was boosted by **semantic representation** in the right perirhinal cortex and fusiform gyrus; no effects found for conceptual memory.

