



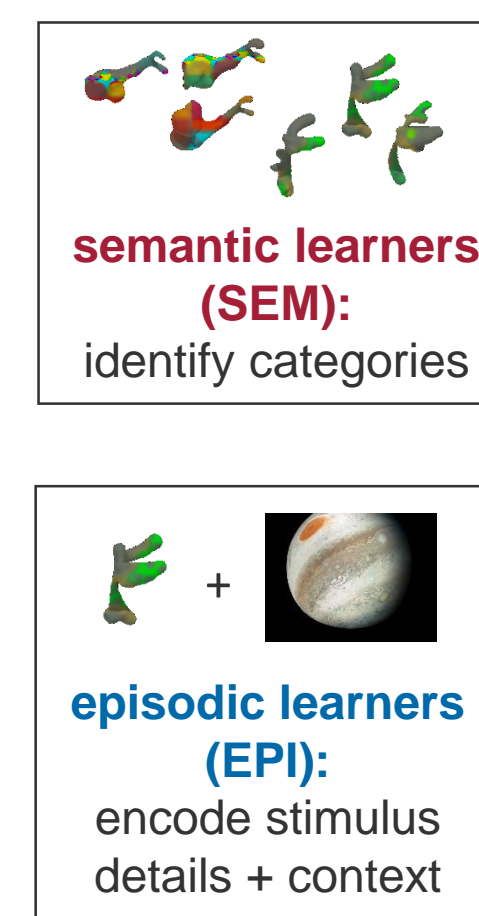
## INTRODUCTION

- systems memory consolidation: two memory systems for declarative memory coding different aspects<sup>1 2 3 4</sup>
  - **hippocampal** system: storing detailed episodic information<sup>2 3</sup>
  - **neocortical** system: extracting regularities; generating schemata<sup>3 5</sup>
- **Concurrent memory encoding** in both systems?

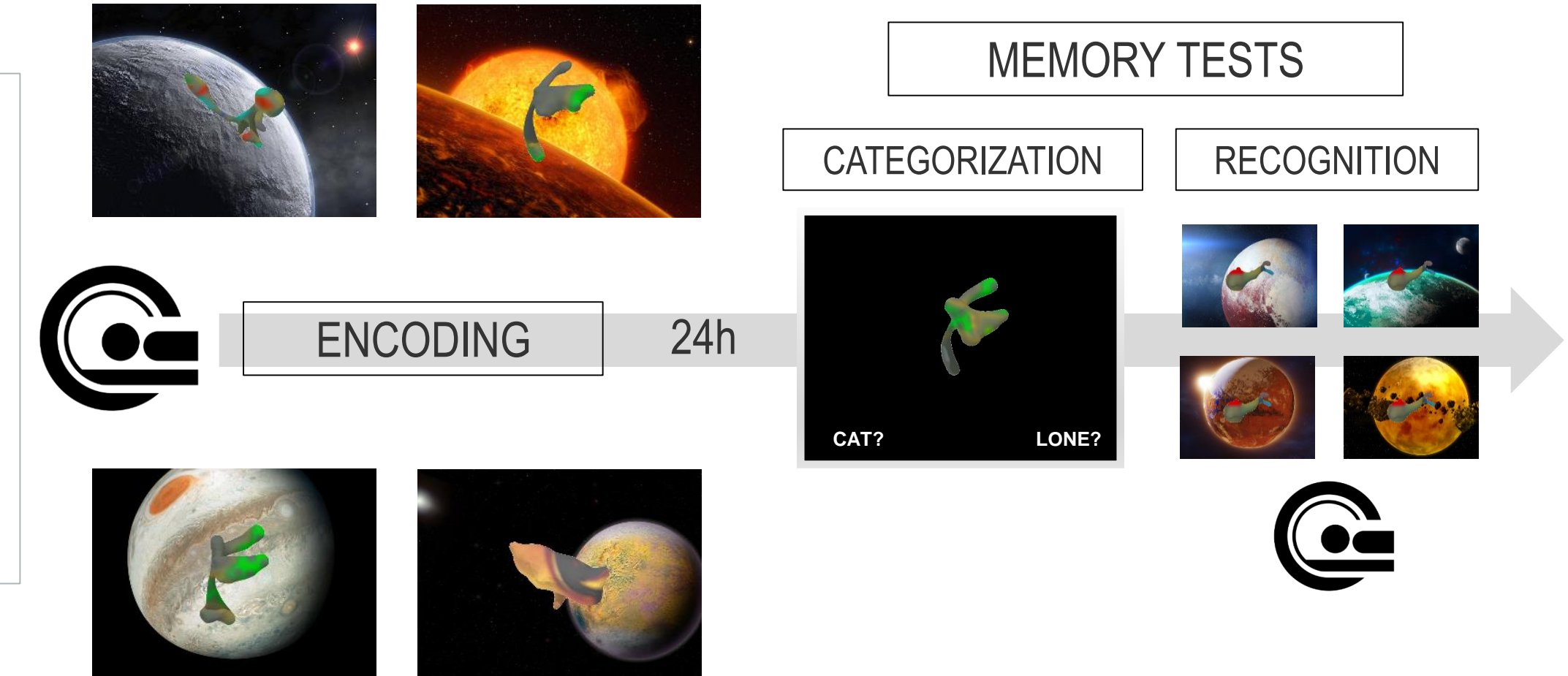
Parallel traces?

## METHODS & MATERIALS

N=80 divided into two groups, different instructions on how to encode the same stimuli:

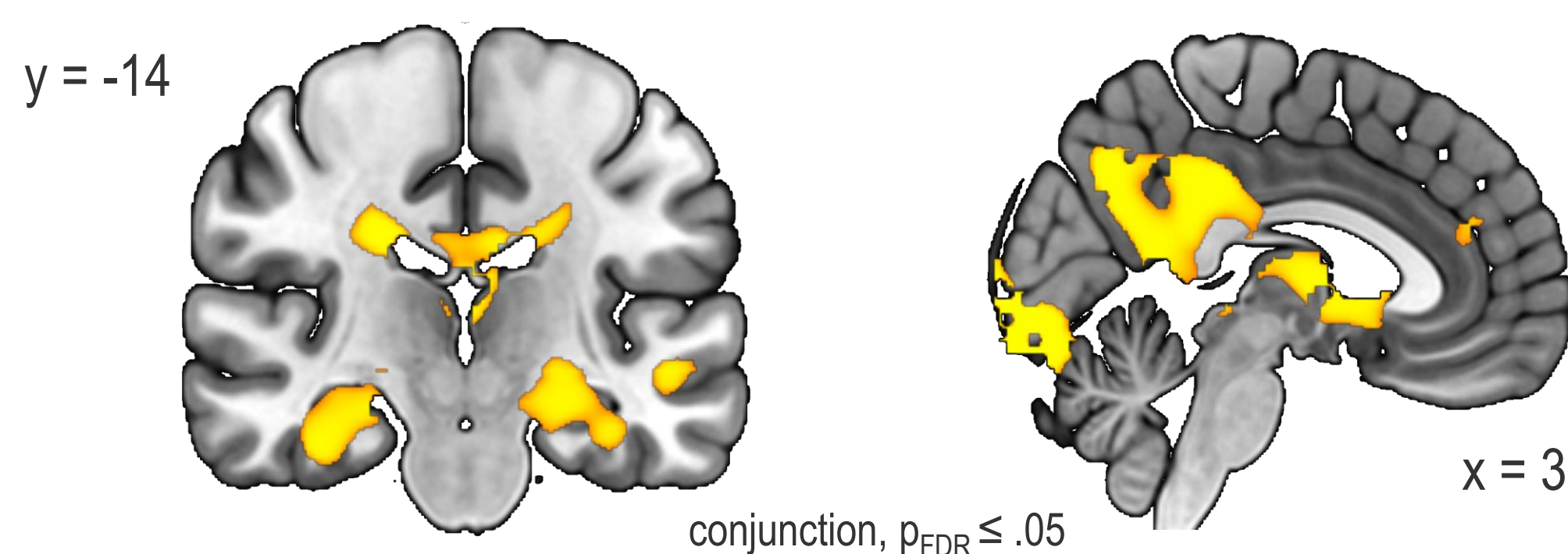


Participants decide whether they are presented with an **exactly repeated (EPI)** or a **familiar looking stimulus (SEM)** based on shape and color



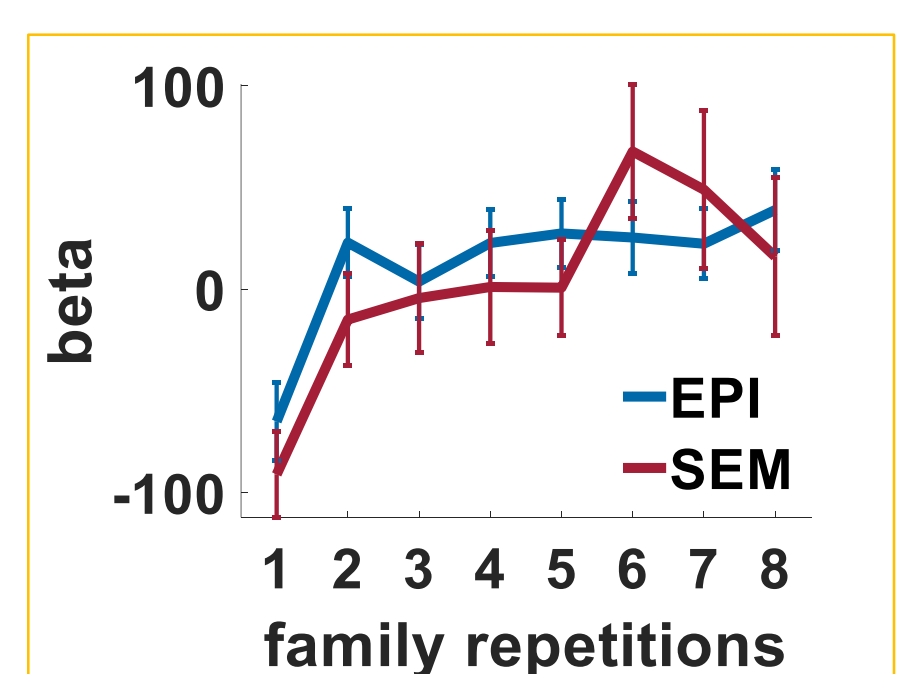
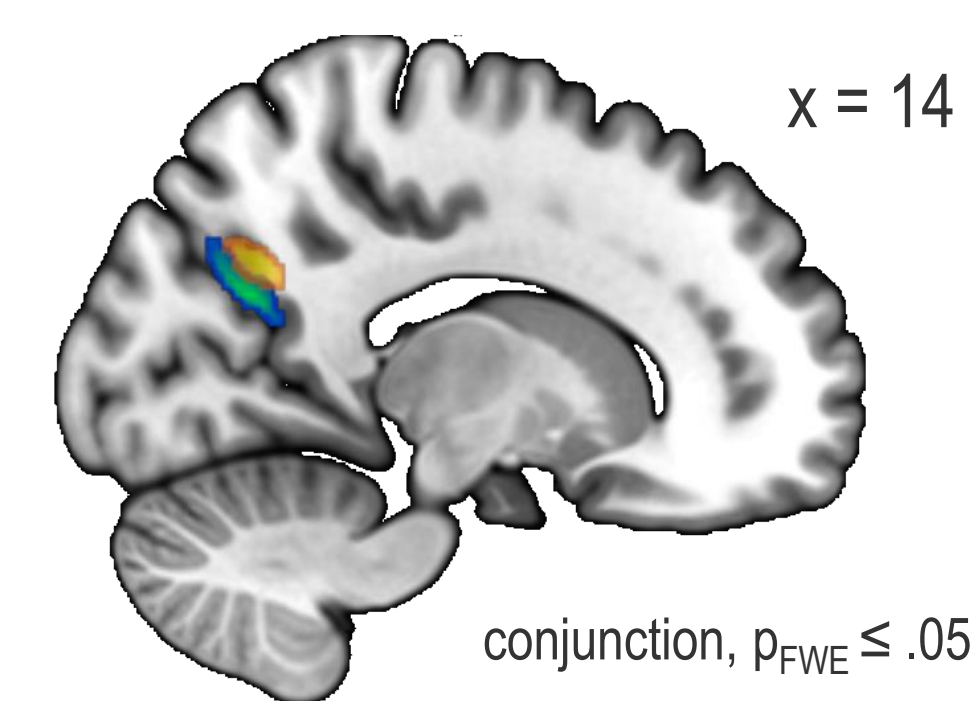
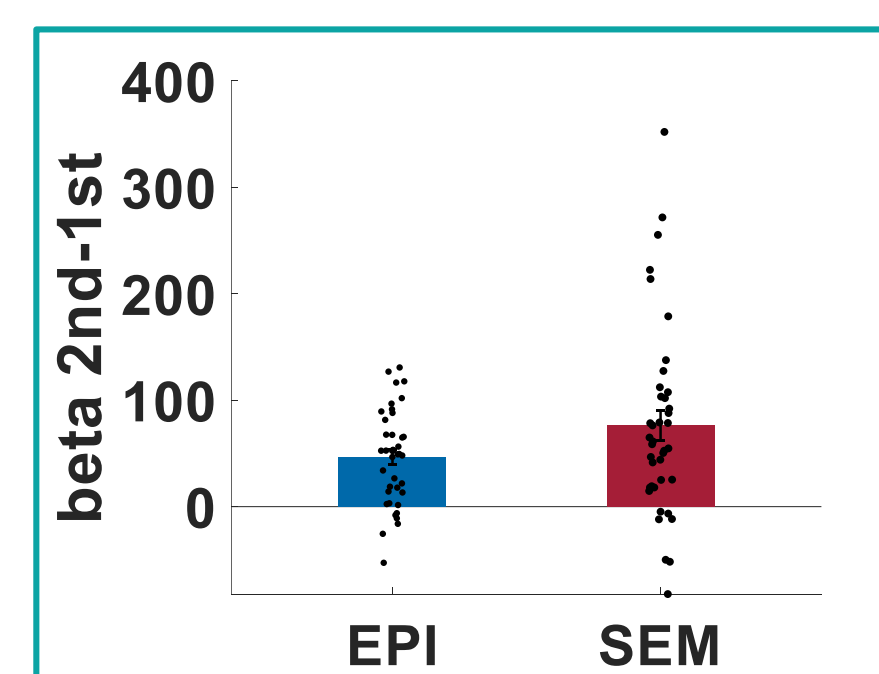
## RESULTS

In both groups the **hippocampus** and the **precuneus** are engaged throughout the task

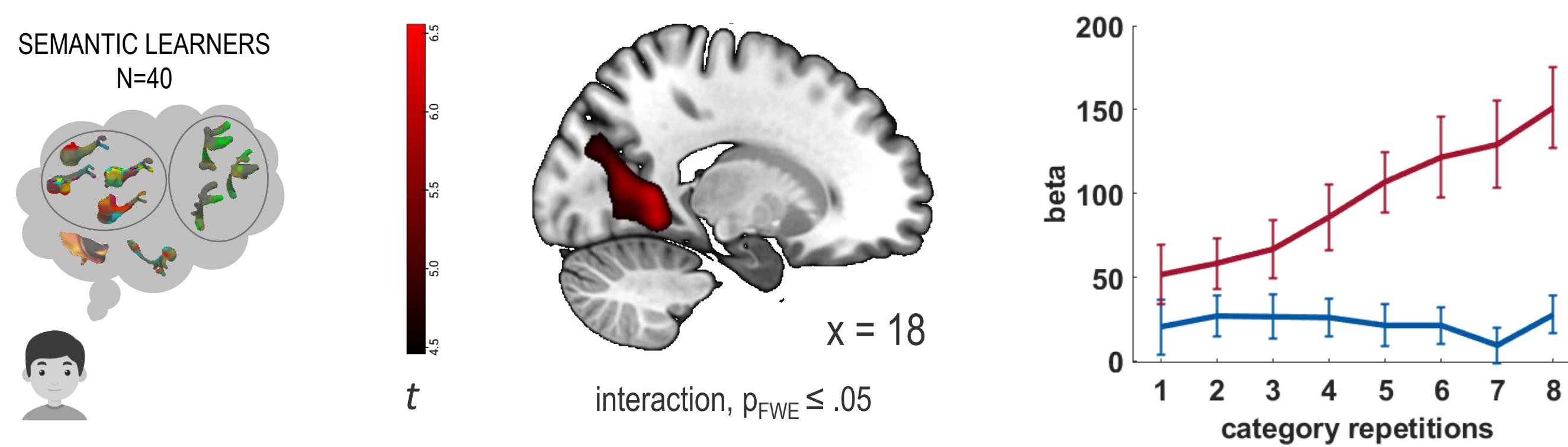


## ENCODING

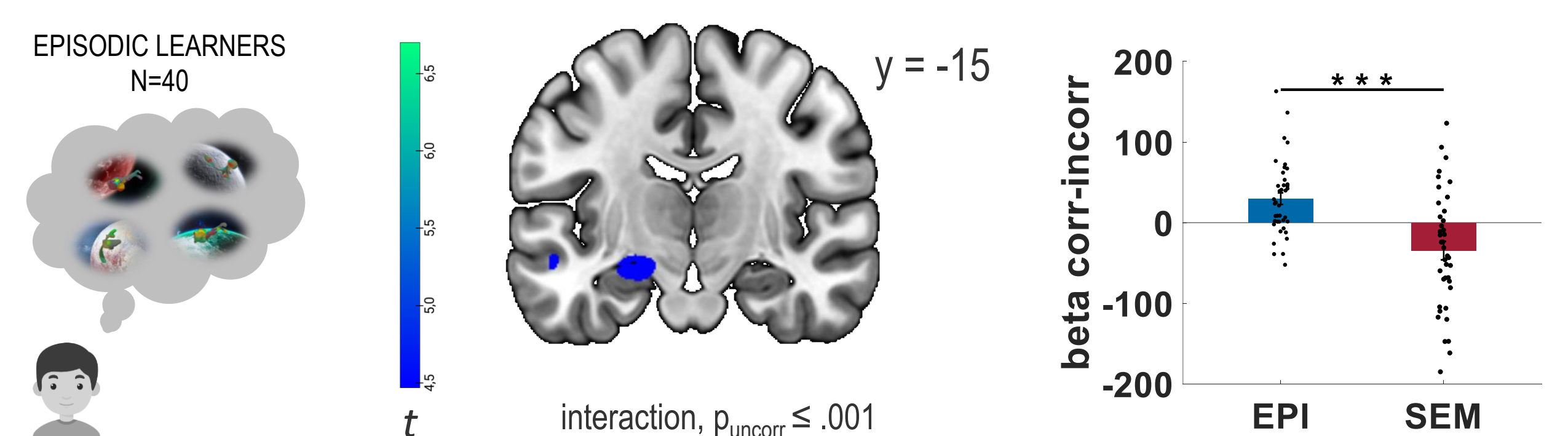
In both groups **exact** and **conceptual** stimulus repetitions elicit precuneus activity



Higher increase of activity in **visual processing areas** in **SEM** compared to **EPI** in response to conceptual repetitions

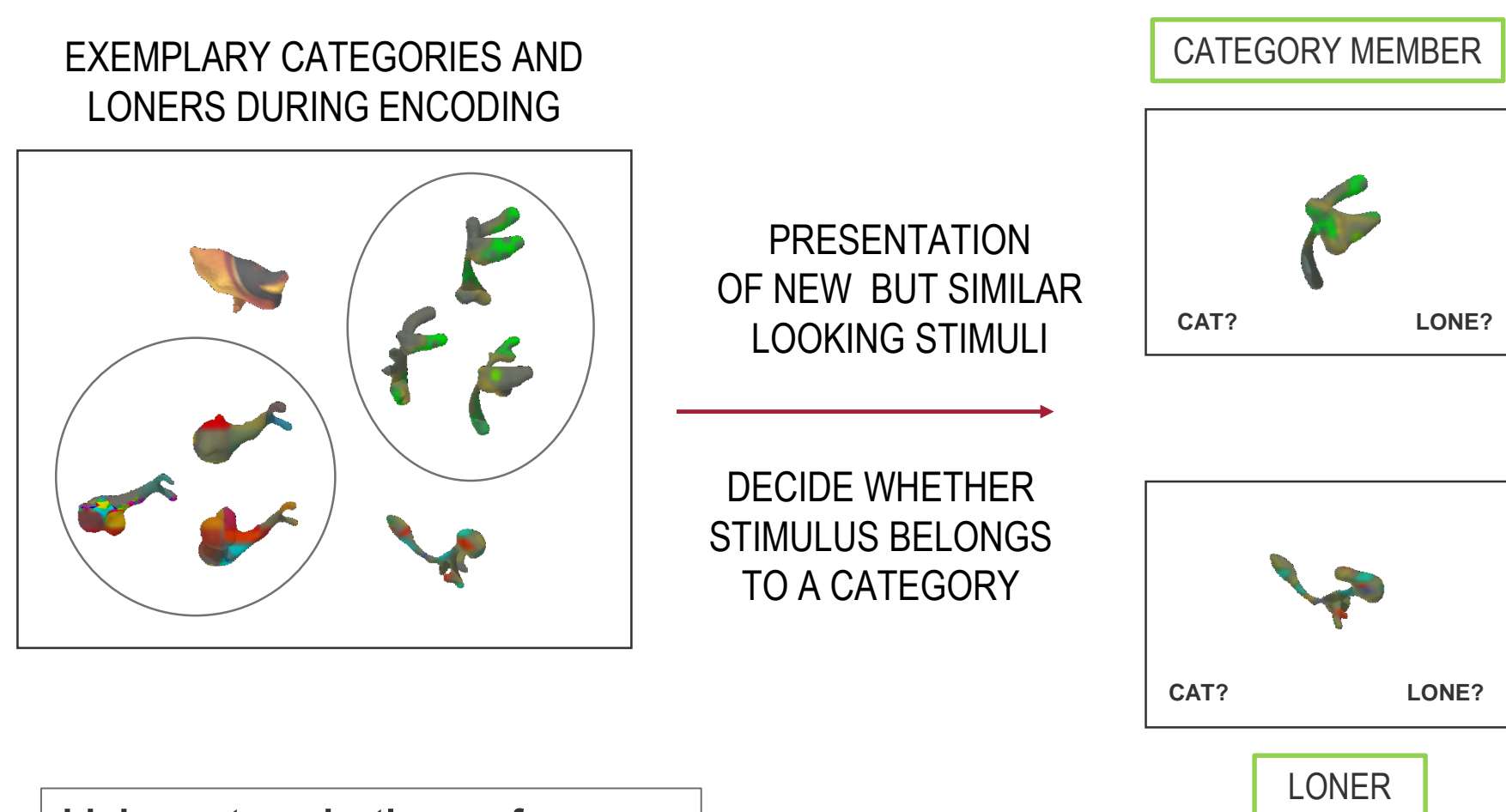


Higher **hippocampal** activity in **EPI** compared to **SEM** for correct responses

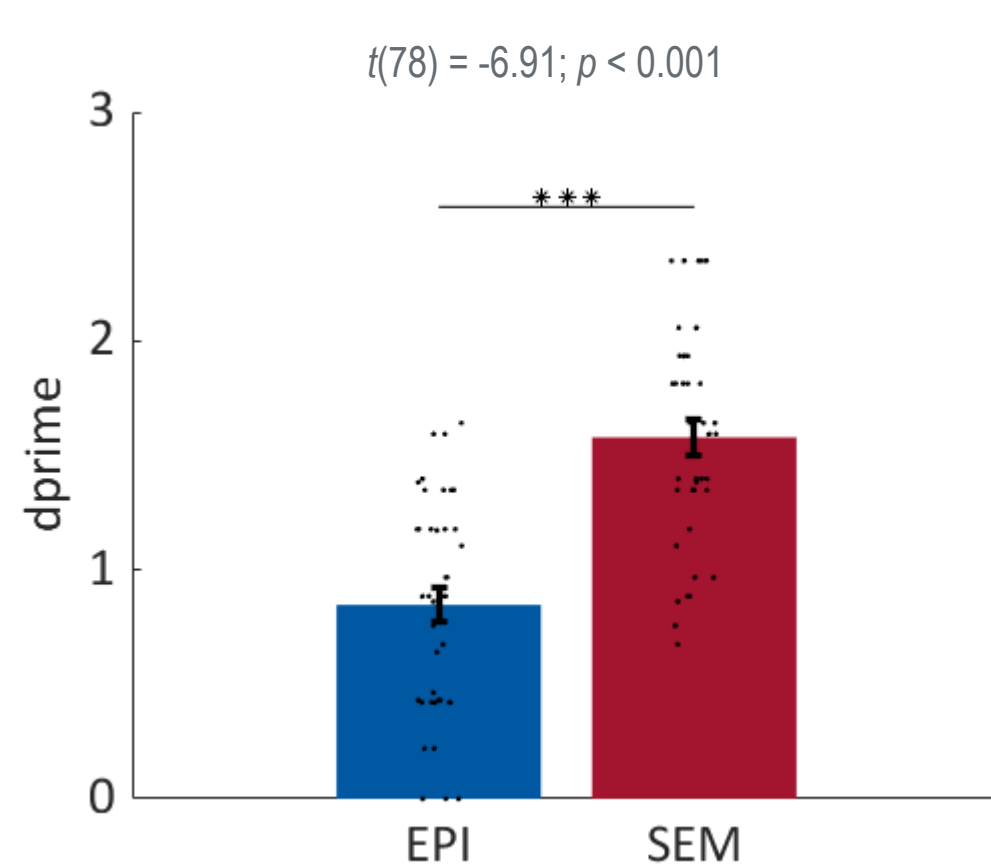


## CATEGORIZATION

How well can participants identify new category members?



higher categorization performance of **SEM** compared to **EPI**

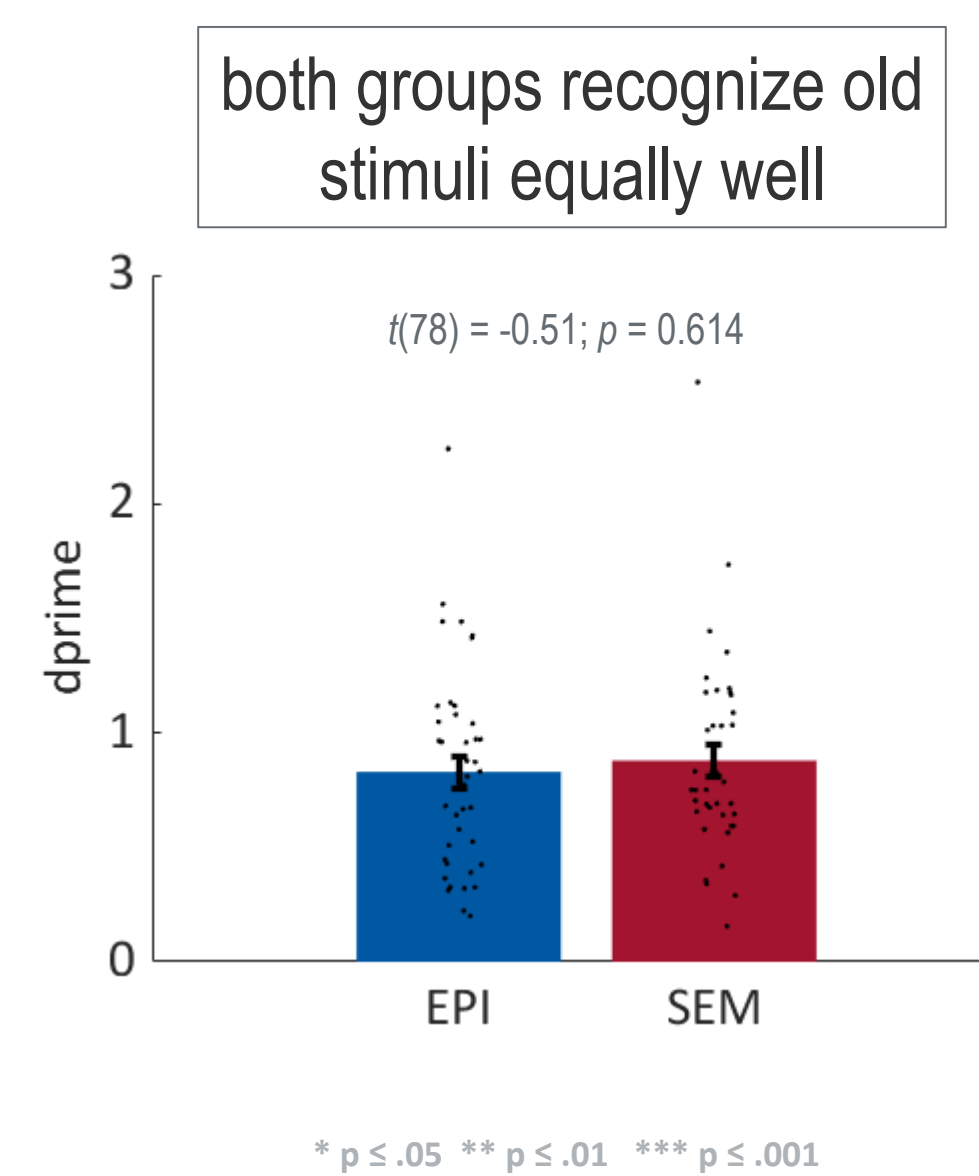
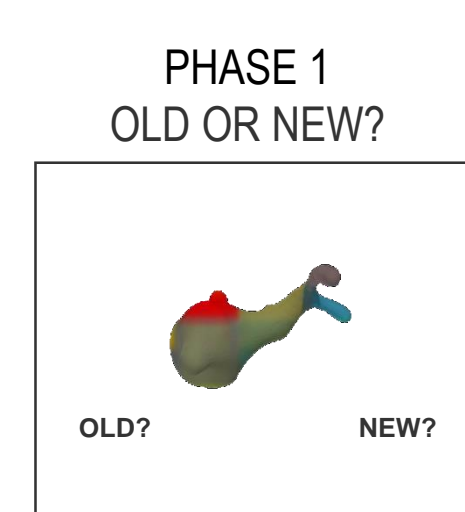


**SEM** are better at assigning new stimuli to categories  
→ **semantic memory**

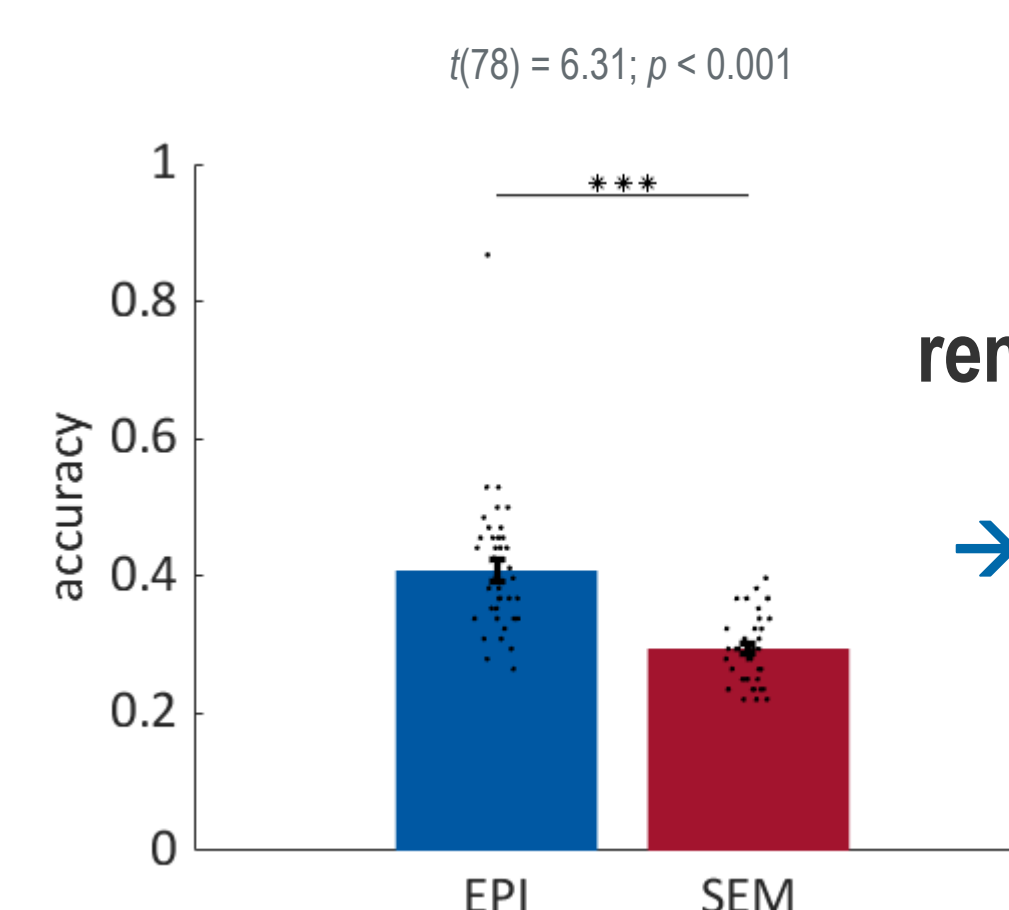
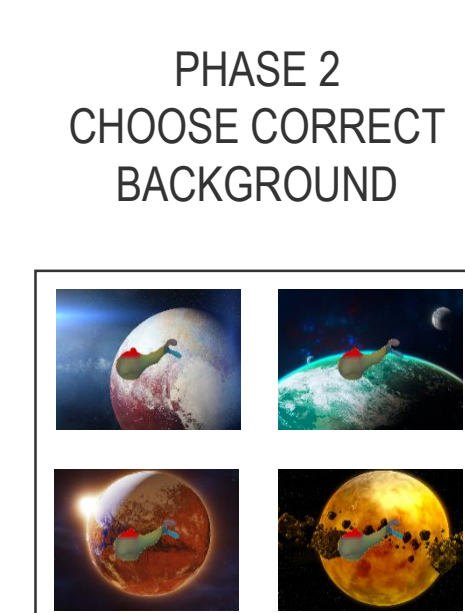
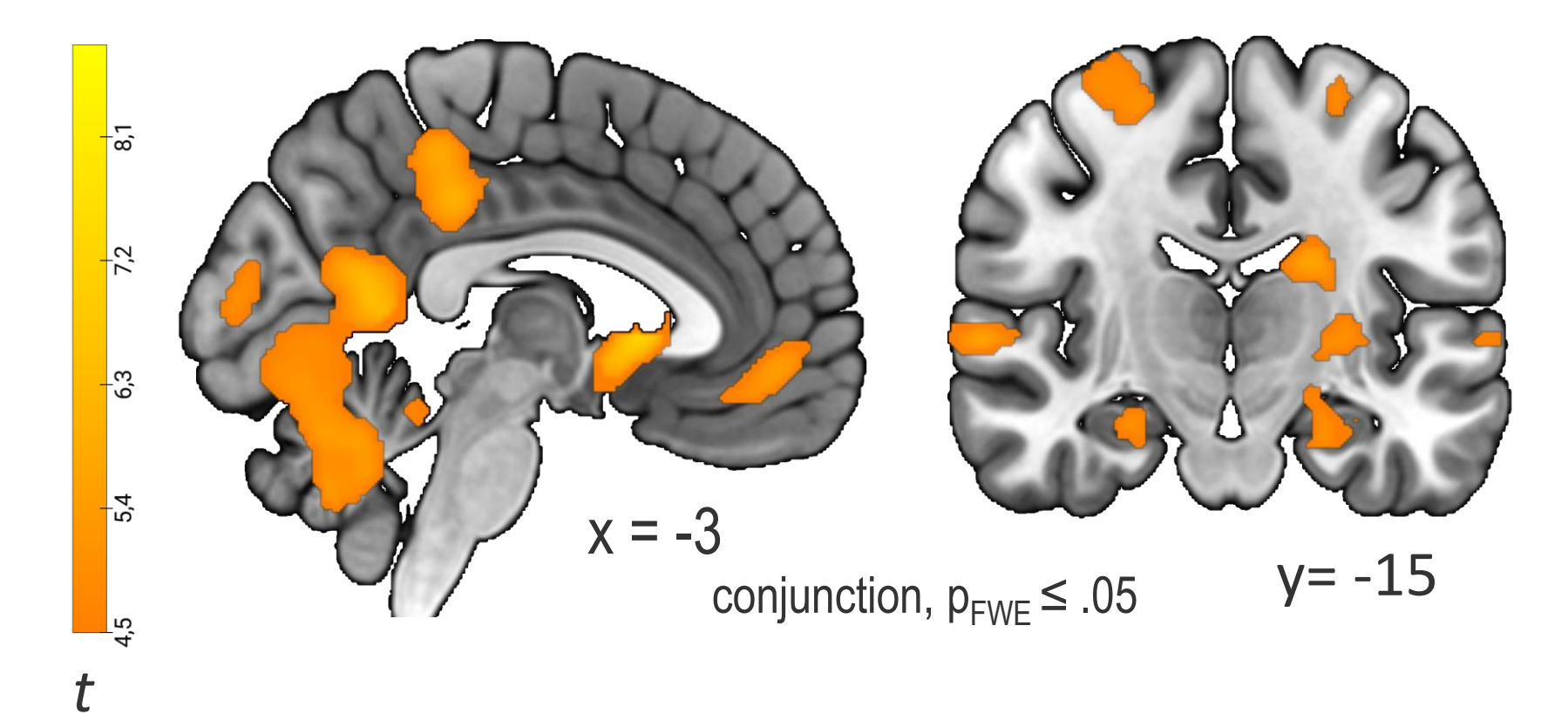
\*  $p \leq .05$  \*\*  $p \leq .01$  \*\*\*  $p \leq .001$

## RECOGNITION

How well can participants recognize old stimulus-context pairings?

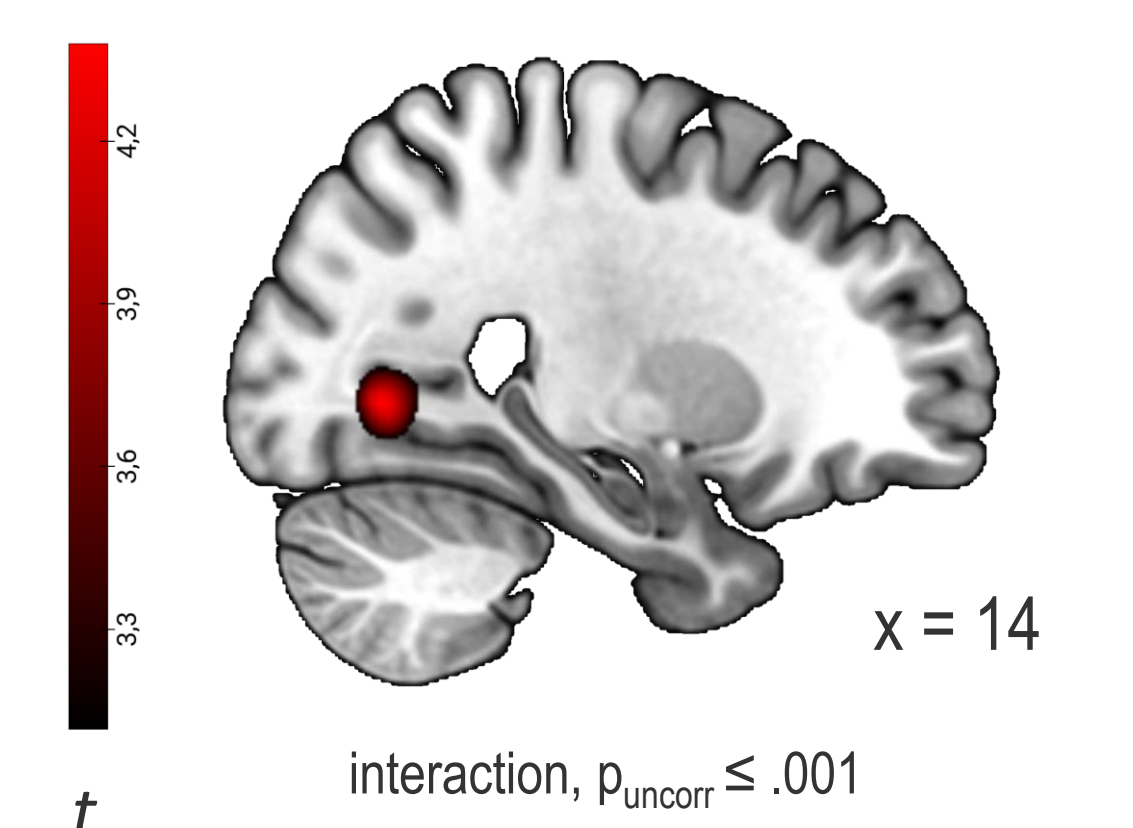


In both groups, the **precuneus**, the **caudate** & the **(para)hippocampus** are engaged in correct responses



**EPI** are better at remembering stimulus-context pairings  
→ **episodic memory**

Higher activation in **visual processing areas** in **SEM** compared to **EPI** during the recognition task



## CONCLUSIONS

- the two groups differ in the **type of information** that is preferentially encoded and remembered 24h later
- both memory systems are **jointly recruited** during encoding suggesting **concurrent memory formation**
- episodic & semantic learners engage **partially overlapping networks**, with semantic processing occurring **preferentially in visual areas**

## REFERENCES

- 1 Marr (1970), Proc R Soc Lond B Biol Sci.
- 2 Moscovitch et al. (2005), J. Anat.
- 3 Sekeres et al. (2018), Neurosci. Lett.
- 4 Kumaran et al. (2016), TICS
- 5 Sharon et al. (2011), PNAS