RAPID FORMATION OF NEW VISUAL CONCEPTS IN EARLY VISUAL CORTEX ASSESSED WITH MULTIMODAL MRI

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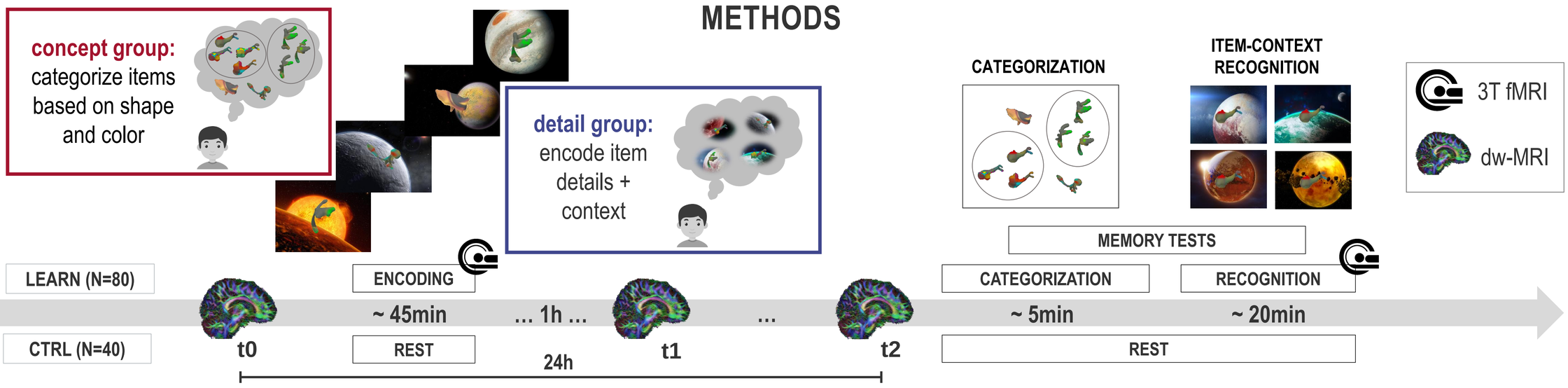
INTRODUCTION

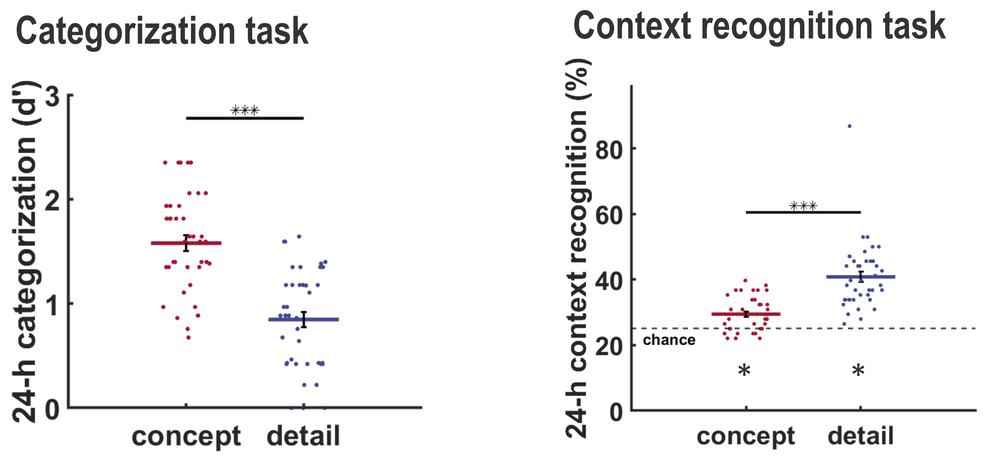
- In the context of declarative memory, the neocortex is traditionally seen as a slow learner[1 2 3]
- Existing schemata can facilitate neocortical integration[4]
- Combined fMRI & dwMRI has identified rapid neocortical engram formation for associations of existing concepts with rehearsal[5]

- Can the neocortex rapidly store entirely novel, abstract information?
- What are the specific neural mechanisms for concept formation?

METHODS

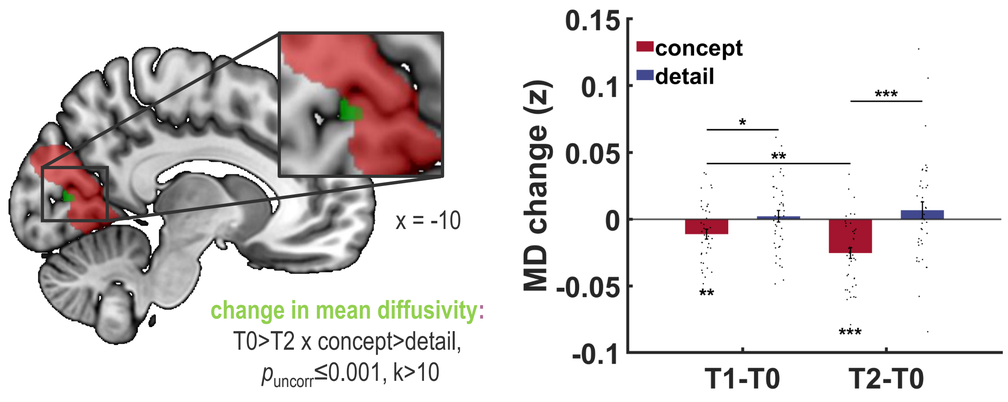


MEMORY PERFORMANCE AFTER 24h

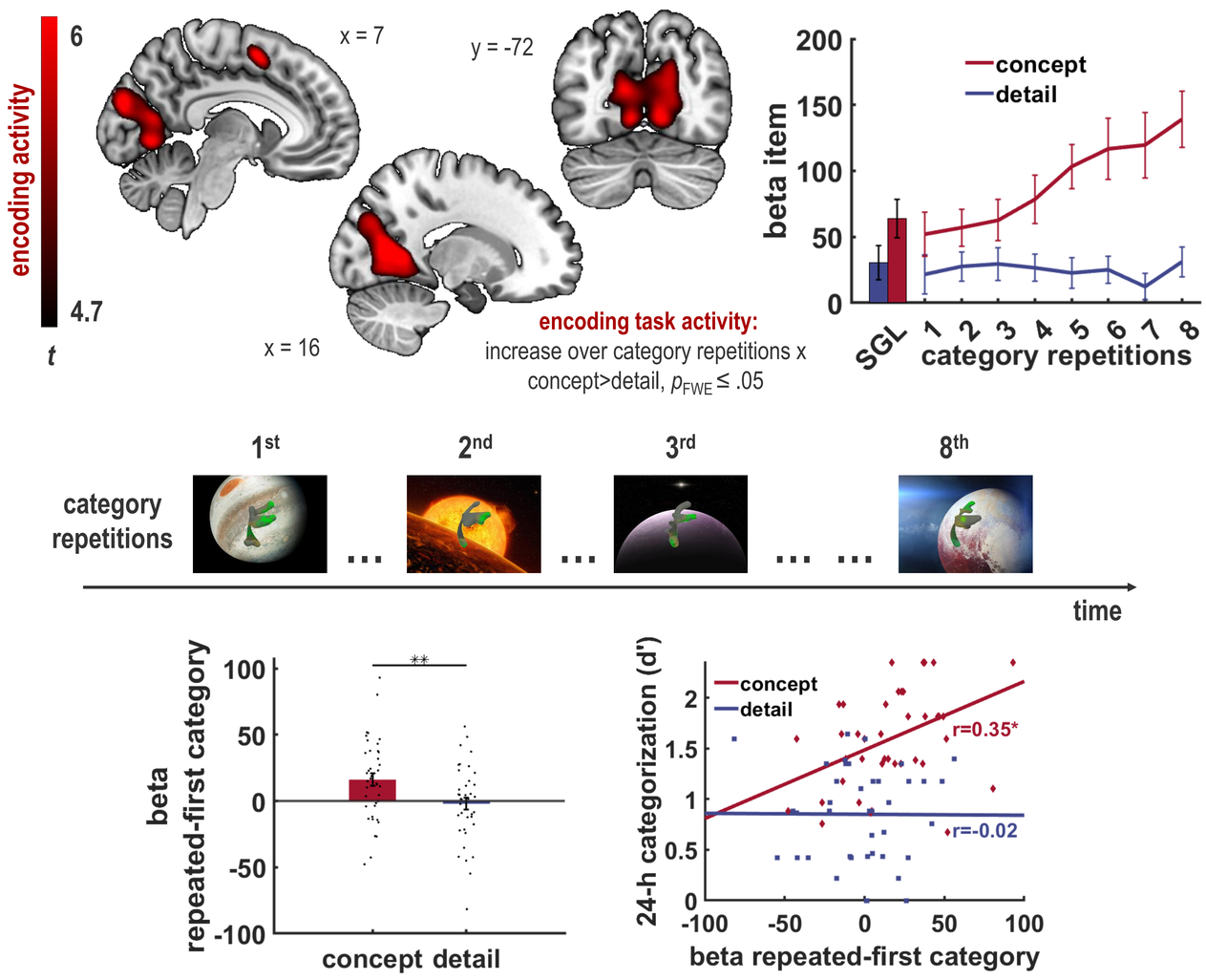


24 hours after encoding, concept learners are better at **assigning new stimuli to the existing categories**, but **remember less item-context combinations.**

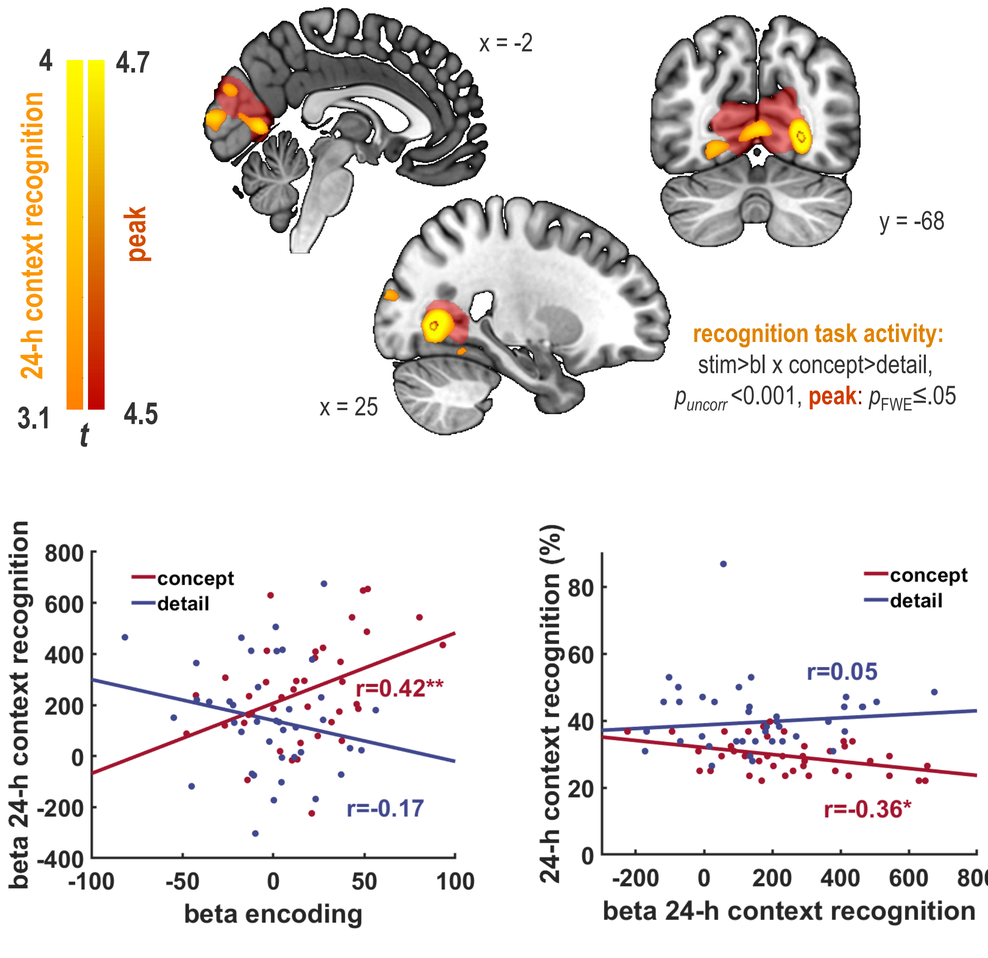
MICROSTRUCTURAL PLASTICITY RELATED TO CONCEPT LEARNING



RAPID EMERGENCE OF CATEGORY-SENSITIVE RESPONSES



CONCEPT REACTIVATION AFTER 24H HINDERS DETAILED MEMORY



CONCLUSIONS

- Visual concept learning induces a **rapid**, **long-term stable** and **behaviorally relevant** increase in functional activation and **changes in tissue microstructure** in early visual cortex
- The neocortex can rapidly form a **memory of entirely novel information**
- New visual concepts reside in **early visual cortex**

REFERENCES

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