

Bound by sight, shared in the mind: the temporal emergence of object co-occurrence representations

Introduction

- In the real world, objects reliably appear alongside other objects in a specific scene.

e.g.,



In kitchen

Seen with
Cheese,
Carrot...

- Prior fMRI work suggests that object representations in the parahippocampal place area are organized by such co-occurrence statistics among objects.

However, it remains unclear...

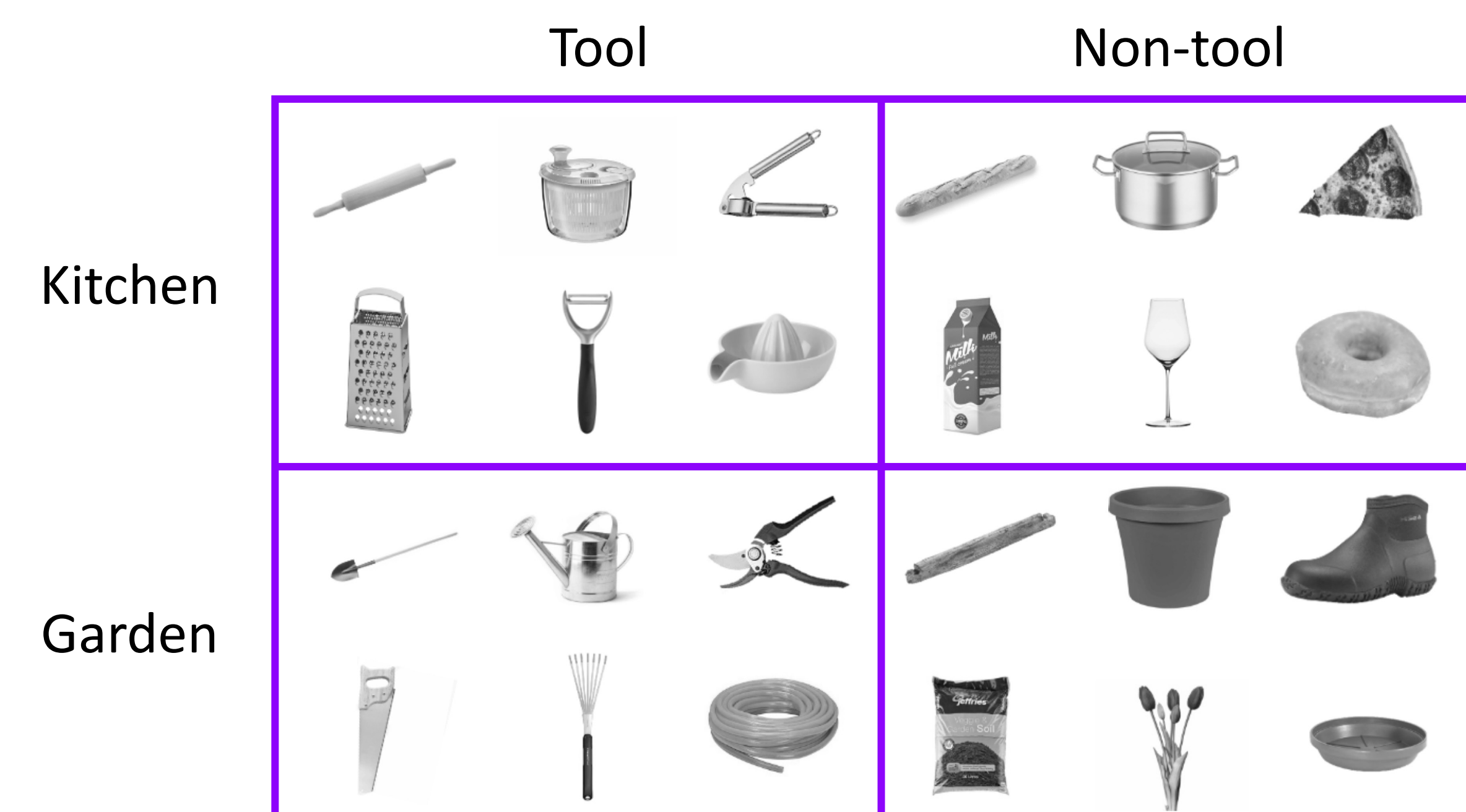
Q1: When do these representations emerge?

Q2: Do they differ from other representational dimensions (e.g., category)?

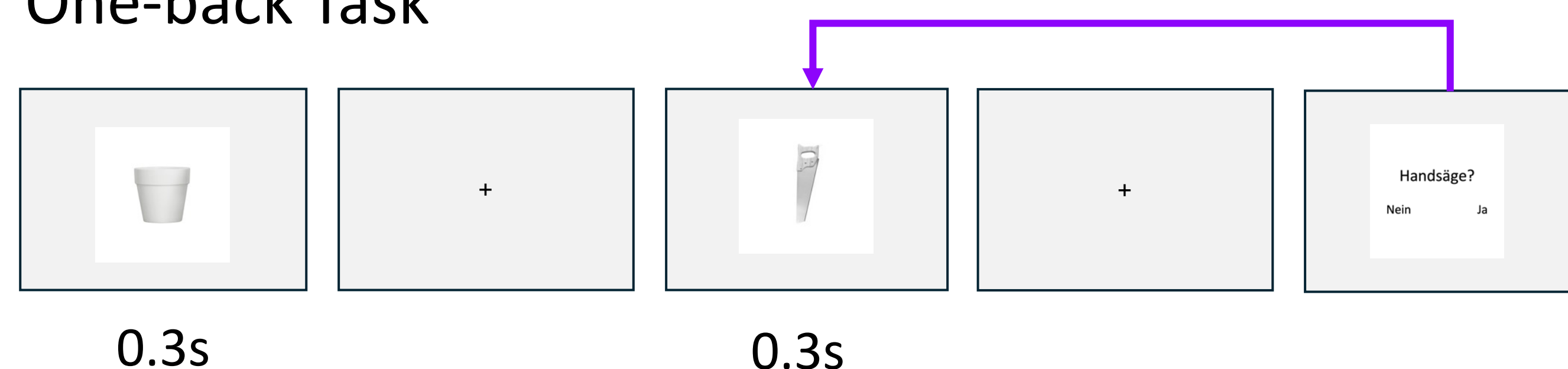
Q3: Do they reflect a mutual priming between co-occurring objects or the activation of shared scene representations?

Methods

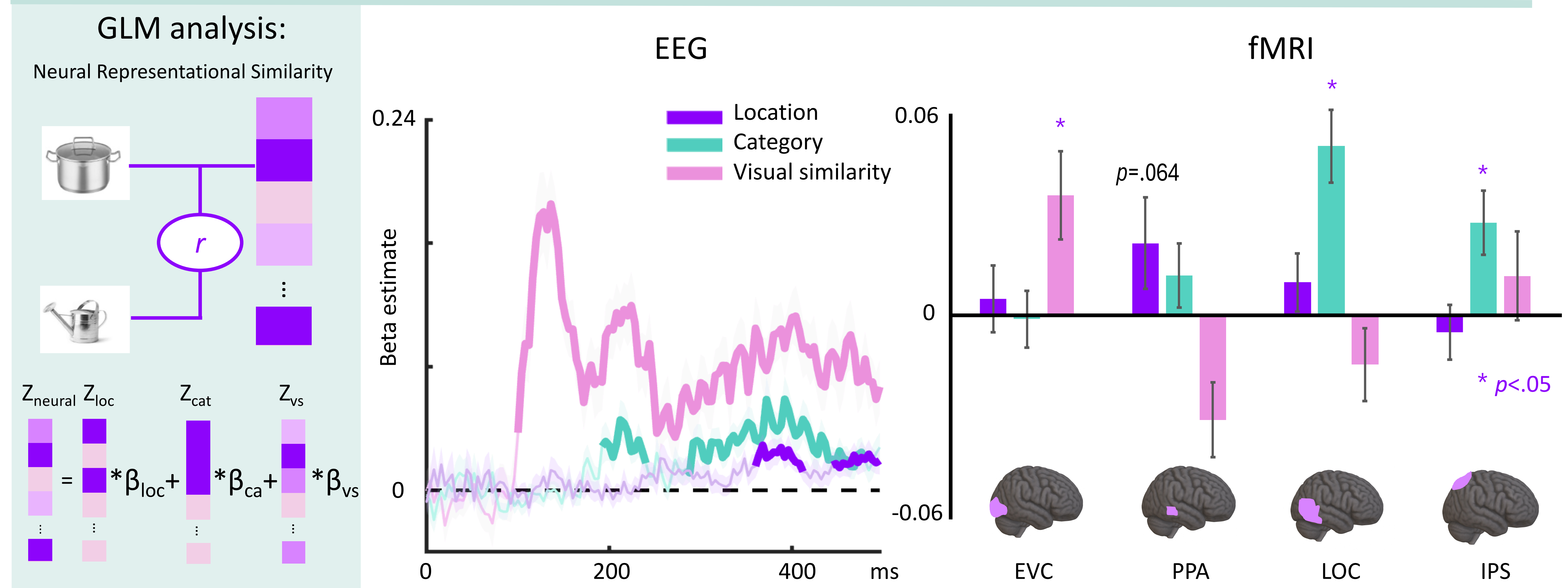
- Stimuli:



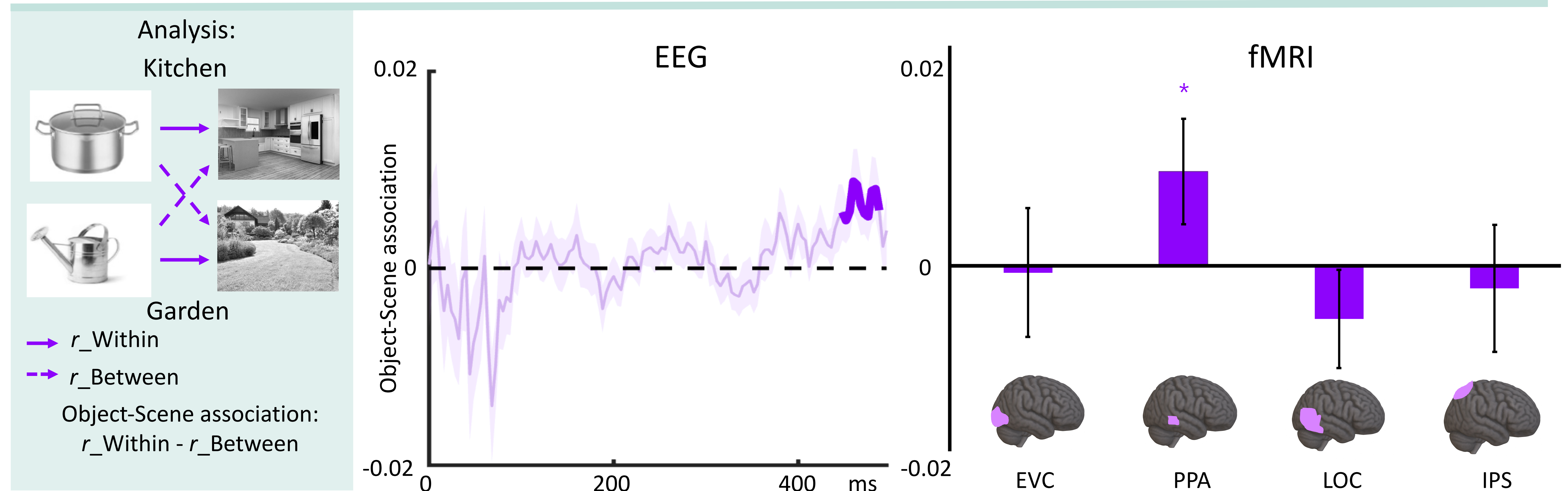
- EEG (N = 34)
- fMRI (N = 28)
- One-back Task



Temporal dynamics of object co-occurrence and category representations



Late object co-occurrence representations reflect scene context activation



Conclusion

- Object co-occurrence representations (~350 ms) emerge later than perceptual (~100 ms) and categorical (~200 ms) representations.
- This effect is partly driven by the activation of associated scene representations (~450 ms).
- Our findings provide detailed temporal and spatial information about object co-occurrence representations and highlight the involvement of scene context in shaping these representations.

