Tracking the development of specific and generalized representations during concept learning

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Background

- Ventromedial prefrontal cortex (VMPFC) and anterior hippocampus contribute to concept generalization by representing information abstracted from individual examples\(^1\) as measured by formal categorization models:
  - **Prototype models\(^2\)**: categories represented as central tendencies (prototypes). Generalization involves comparison to category prototypes.
  - **Exemplar models\(^3\)**: categories represented as individual instances (exemplars). Generalization involves joint consideration of all category exemplars.
- Prior work suggests that memories transform from specific to generalized\(^4\) and from hippocampus-based to cortex-based\(^5\) over time.

Do concept representations in the VMPFC and hippocampus shift from exemplar-based to prototype-based across learning?

Categorization models

- Trial-by-trial fMRI predictors generated for each subject.
- Prototype advantage in behavior throughout learning and in the final test.
- Final generalization: prototype correlates in the anterior hippocampus and VMPFC, but not posterior hippocampus.
- Interim tests: prototype correlates emerge in the anterior hippocampus before VMPFC. Exemplar correlates in the posterior hippocampus do not precede prototype correlates in the anterior hippocampus.

Conclusions

- Replicate previous study showing prototype correlates in the anterior hippocampus and VMPFC.
- Prototype correlates emerge in anterior hippocampus before they emerge in cortex (VMPFC).
- No evidence for shift from exemplar to prototype correlates.

References

2. Smith & Minda (1998), JEP: LMC.

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