Decoding episodic retrieval processes: Frontoparietal and medial temporal lobe contributions to free recall
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Introduction

Question: Neuroimaging investigations of recognition memory have identified distinct neural systems associated with processing item familiarity and episodic recollection during recognition memory tasks - are these processes both recruited during free recall?

H1. Anatomical regions that support recollection include hippocampus, posterior parietal cortex, and medial prefrontal cortex mediate retrieval not only during recognition but also during free recall of items. This prediction is consistent with long-standing models of free recall.H2. The neural substrates that mediate processing of item familiarity including the anterior medial temporal lobe (MTL), dorsal parietal cortex, and lateral prefrontal cortex, additionally support free recall.

Methods

Encoding

- We used univariate conjunction analysis and multivariate pattern analysis of fMRI data collected while 20 subjects performed free-recall and source recognition tasks. Similar neural engagement provides evidence for common cognitive operations mediating retrieval across tasks.

Source Recognition

- Support Vector Machine Classification
  - Subject: Class: Pattern
  - Train SVM
  - Test SVM
  - Cross-validated Accuracy
  - Decoding Free Recall
  - Decoding Source Recognition and Recall: Item Familiarity and Recall Success

Conclusions

We used univariate conjunction analysis and multivariate pattern analysis of fMRI data collected while 20 subjects performed free-recall and source recognition tasks. Similar neural engagement provides evidence for common cognitive operations mediating retrieval across tasks.

Item Familiarity Classification

Step 1: Train classifier to identify item familiarity processes

Whole Brain:
- Average Classifier Weights
- Functional Network: Frequency map of features (n=folds)

Item Familiarity during Free Recall

Step 2: Decode retrieval during free recall using item familiarity classifier

Whole Brain:
- P(Correct Reaction)
- Functional Network:

(source: https://www.journals.elsevier.com/memory)