Perception and recall of narrative event schemas

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Approach

Understanding and remembering everyday experiences requires maintaining **situation models** of ongoing events

Situation models are built from **schematic templates**

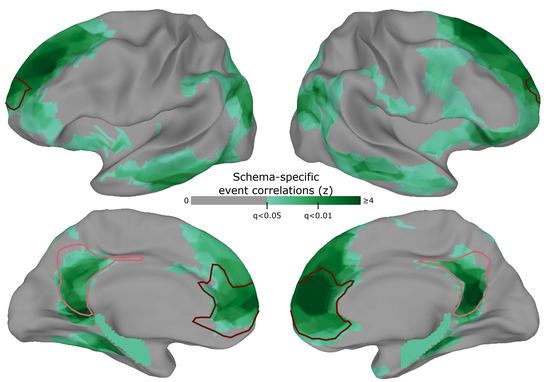
How do **story-specific** and **schematic** representations interact during perception and memory?

Experimental design

Subjects watched/listened to 16 stories from two schemas
Subjects then freely recalled all stories in the scanner

Stimuli

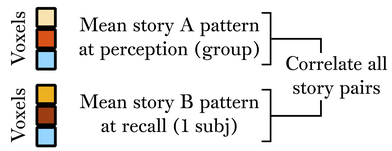
Schema Representations at Encoding

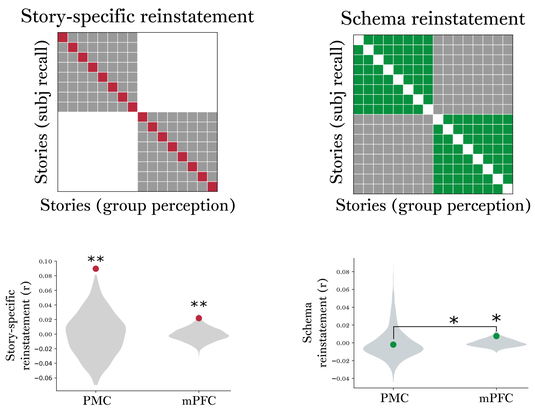


Key ROIs
- Posterior Medial Cortex (PMC)
- Medial Prefontal Cortex (mPFC)

Story and Schema Reinstatement

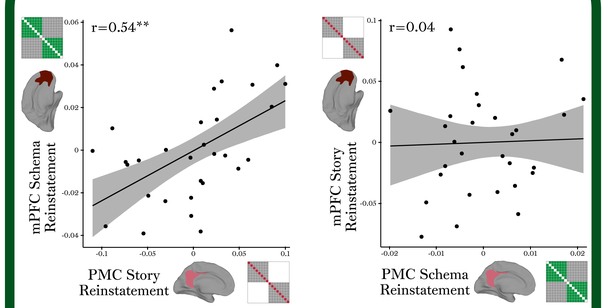
Measure reinstatement at recall by comparing to group story templates during encoding





Both PMC and mPFC reinstate story patterns, but only mPFC reinstates schematic patterns

Brain ROI Correlations



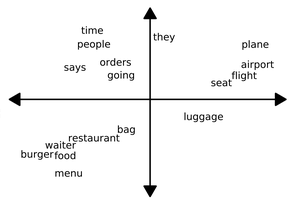
Reinstatement of story-specific details in PMC is associated with schema reinstatement in mPFC

Scoring Behavior with Word Vectors

Word embedding models map words to vectors

Words found in similar contexts get similar vectors

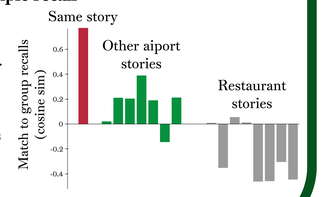
Examples: **fastText**, word2vec, GloVe, LexVec



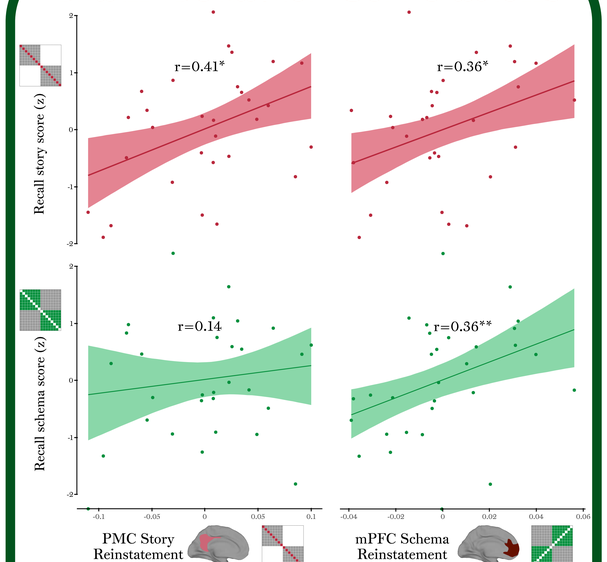
Score subject recalls for story and schema content by similarity to other subjects' recalls, in word vector space

Example recall

"All right, so this one was the one, a blonde woman was heading up the escalator; she had a plane to catch at an airport. She had one rolling bag with her. And another guy who was also at the airport, Tom Cruise, so kind of suspicious looking, bumps into her, blames it on looking at his phone, and then they go through security. So she has all these different mufflers and exhaust parts from cars, older cars, mentions she has all these things because she likes to restore old cars..."



Brain-Behavior Correlations



Story-specific score associated with PMC and mPFC
Schematic score only strongly associated with mPFC

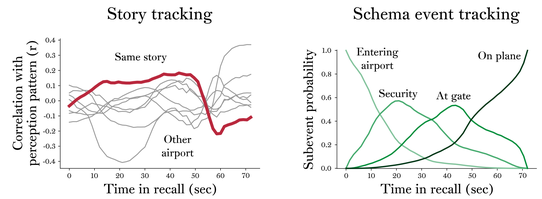
Summary

- Both PMC and mPFC represent stories from the same schema with **similar patterns during perception**
- These **schematic patterns are reinstated** only in **mPFC**
- **Schematic** reinstatement in **mPFC** may improve the reinstatement of **story details** in **PMC**
- **PMC** story reinstatement linked to more **story-specific words** during free recall
- **mPFC** schema reinstatement linked to increased **story-specific and schematic words** during free recall

Next Steps

- Are story reinstatement, schema reinstatement, and recall behavior linked at **finer timescales**?

Example: Tracking mPFC during recall of an aiport story



- Are **other brain regions** critically involved in schematic reinstatement, such as hippocampus or superior frontal gyrus?
- Does this interplay between mPFC and PMC also occur for other types of naturalistic schematic memory?
  - Schemas for social interactions?
  - Memory for objects in scenes?
  - Navigation and spatial memory?

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