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Narrative Memory: a story told by the hippocampus

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Introduction

- We often remember past experiences in the form of a story. We can even form narratives from events which occur at disparate times.
- Yet, the neuroscience of memory has historically tried to understand how we remember specific periods of time, or "events."
- The hippocampus is necessary for remembering specific events. One possibility is that the hippocampus organizes our memories in time.¹
- However, we previously found that narratives can bridge the gap between events in our memory, making events easier to remember.²
- Hypothesis: the hippocampus might link two events together in memory when they can form a single, coherent narrative.

Functional MRI (fMRI) approach

Day 1: Memorize fictional stories during fMRI

- Participants memorized stories, in which characters appeared in separated events
- These "sideplot" events could form a Coherent Narrative, or not (Unrelated Narratives)



Day 2: Recall events during fMRI

Participants were asked to recall all events involving each character, using a microphone in the MRI scanner Recall was transcribed and then scored in a blinded fashion



Narrative Memory: a story told by the hippocampus

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ed	Coherent
es	Narrative
S	Melvin leaves
vith	the oven
er	unattended
fell	Melvin's
	kitchen is
	covered in ash

Recall Sandra events

- We isolated patterns of activity in the hippocampus
- We correlated patterns of activity between Day 1 and Day 2 (i.e. "pattern similarity")
- Pattern similarity tells us how much the hippocampus "reinstates" a memory for each event during recall

Result: Hippocampus preferentially reinstates memories for Coherent Narrative events

- When a new event reminds you of an old event (i.e. Event 2), you have the chance to create a narrative that bridges those two events
- Meaning, your memory for Event 2 might contain information about Event 1 – i.e., a linked "narrative memory"
- LEFT: the pattern of activity from Event 2 was preferentially reinstated during recall of Coherent Narrative events
- RIGHT: Event 2 pattern reinstatement predicted the number of details recalled for both Coherent Narrative events *
- This suggests that, during Event 2, the hippocampus interwove Events 1 and 2 to form a single narrative memory

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Summary

• The hippocampus organizes our experiences into larger narratives in memory³: (1) by incorporating memories for old events into memories for new events; (2) by preferentially supporting our recall of events that form coherent narratives. These findings may pave the way for applications in early-stage cognitive decline, education, and literary theory^{4,5}.

References



Day 2: Memory Recall



Coherent Narrative
Unrelated Narratives

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