How do different memory systems interact?

Working memory (WM) maintains information across delays; during these delays, episodic memory (EM) replays recent experiences.

Does episodic memory replay intrude on WM maintenance?

Approach: We test the idea that reinstatements from EM occur even under the conditions of a traditional “pure WM” manipulation

- Reinstating an episode renews its temporal and associative context (Howard & Kahana, 2002)
- Recalling a given context can cause the subsequent, involuntary recall of other memories sharing that context (Hupbach, Gomez & Nadel, 2009)
- These involuntary recalls are indexed by neuroimaging measures of context reinstatement (Gershman, Schapiro, Hupbach & Norman, 2013)
- These recalls occur, as indexed by neuroimaging measures, even at short delays typically associated with WM not EM (Hannula, Tranel & Cohen, 2006)

Hypothesis: During WM task delay periods, episodic memory replay intrudes on WM maintenance. These intrusions carry context, which impacts performance.

Methods: Measuring which participants are recalled during the delay on each trial

Use fMRI to measure which contexts participants (n = 36) recalled during DNMS delays. 4-way MVPA classifier trained to identify face/scene X left/right.

Does recalling the original word list during the delay introduce those words into WM, making it harder to reject any word associated with the original context as a probe?

Conclusions

1. Performance on an interference-free working memory task was impacted by context information from episodic memory.
2. Episodic memory intrusions during working memory maintenance significantly predicted trial-by-trial changes in RT.
3. Context evidence affected the fidelity of working memory representations, as measured using Drift Diffusion Models (DDM).

References


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