Intact working memory for objects-in-scene information after hippocampal damage: The importance of memory load

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Background

Patients with hippocampal damage are sometimes impaired at remembering relational information across delays as short as a few seconds [1-3]. How are these impairments to be understood?

Is the hippocampus required for retention of relational information, regardless whether the task depends on working memory (WM) or long-term memory (LTM)? Alternatively, is the hippocampus required only when WM capacity has been exceeded?

Method

Experiment 1: continuous recognition test format

- Repeated (match) and manipulated (non-match) test trials were systematically interleaved among study trials (novel scenes). This task was used in an earlier study [1].
- Task: Decide for each scene whether it had appeared earlier in the series, and then (if "yes") whether any items in the scene had changed location.

Results

Experiment 1 (continuous recognition)

- Percent Correct across lags and conditions

Experiment 2 (conventional study-test)

- Reduction in volume (% of control)

Summary and Conclusion

The patients were intact on the test where memory load was minimal, but they were impaired on tests where memory load was greater.

The results are consistent with findings of other studies exploring the role of the medial temporal lobe in retention of relational information across short delays [4, 5].

These findings suggest that retention of relational information is dependent on the hippocampus only when WM is not sufficient to support performance such that performance depends, at least in part, on LTM.

Supported by the Medical Research of the Department of Veterans Affairs, NIH Grant MH24600, and the Metropolitan Life Foundation.

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References: