

## **The Effects of Reactivation on Hippocampal Activity in Episodic Retrieval: An fMRI Study**

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The current study examined the effect of repeated retrieval of personal episodic memories on hippocampal activity as measured by fMRI. Twenty subjects, aged 35-65, participated in the study that took place over the course of a month. A total of 36 personal life event memories occurring more than 2 years ago were collected and recorded from each subject throughout the month; 24 memories were recollected on Day 1, and 12 of these events were rehearsed 4 times throughout the month (rehearsed); the remaining 12 memories were not rehearsed again (unrehearsed Day 1). An additional 12 memories (unrehearsed Day 28) were collected on Day 28, two days prior to scanning (Day 30). In the scanner, subjects were instructed to retrieve all 36 memories. A sentence completion task was used as a control condition in the scanner.

Increased activity for all memories conditions compared to the control task was observed in bilateral hippocampus, parahippocampus, precuneus, medial prefrontal cortex, and basal ganglia. When the rehearsed condition was contrasted with the unrehearsed conditions, increased activation was observed in the supramarginal gyrus and other prefrontal areas, portions of the lateral temporal lobe, parahippocampal gyrus, insula, and lenticular nucleus. When the unrehearsed conditions were contrasted with the rehearsed memories, bilateral activations were seen in the hippocampus proper, anterior cingulate gyrus, and right medial prefrontal cortex.

These data, supported by behavioral analyses of the memories, suggest that the effect of multiple recent rehearsals resulted in decreased activity of the hippocampus as the memories became more “scripted” and lost detail over time. The unrehearsed memories may have involved greater recollective experience, as suggested by behavioral data, and the increased hippocampal and prefrontal activations.