

Evidence for Frontal Lobe-based Mechanisms in Prospective Remembering

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Introduction

Failures of prospective memory are common in everyday life, yet not widely studied in the laboratory. Prospective memory requires the individual to remember to perform a future event. Einstein and McDaniel (1990) have suggested that prospective memory actually involves two components: remembering that something needs to be remembered (the prospective component), and remembering the information itself (the retrospective component). They also make the distinction between event-based prospective memory, which requires some action when an external event takes place, and time-based prospective memory, in which action is required after a specified time interval has passed. Time-based remembering is hypothesized to rely on self-initiated memory processes because no external event acts as a cue for remembering. The individual must continuously shift attentional resources between other tasks and the monitoring of time. This "multi-tasking" aspect of time-based prospective memory may be especially vulnerable to problems with planning and the reallocation of attentional resources, and suggests a possible role in these tasks for the frontal lobes. In Cockburn's (1995) case study of a frontal lobe patient, it was found that the patient could remember to perform actions when they were embedded in an ongoing activity, but had great trouble when the task involved suspension of one activity in order to begin another (contextual shift) (see Kvavilashvili, 1992).

Methods/Discussion

The present study involves participants who have been asked to complete a survey of general knowledge (presented and responses recorded on computer). The participants had two tasks: to inform the researcher of how far they had progressed every five minutes (requiring a contextual shift), and to type their names into the computer upon completion of the survey (an embedded activity). The only time piece available to the participants was on the computer and was accessed by pressing a specified key. Our primary dependent measures were: number of clock checks, timing of clock checks relative to 5 minute epochs, and accuracy on each of the two prospective memory tasks.

We also administered several other cognitive measures to each participant. These included: an intelligence test

(Kaufman Brief Intelligence Test), and two measures of executive functioning/cognitive flexibility (Stroop Color Test and Wisconsin Card Sort Test - WISC). The later two measures assess subtly different frontal lobe processes. The Stroop test primarily assesses sensitivity to interference from competing stimuli, while the WISC assesses an individual's tendency to perseverate - a difficulty in shifting from one aspect of a task to another. By correlating these two measures with performance on the prospective memory tasks, we have begun to address which cognitive processes crucial to prospective forms of remembering are carried out by the frontal lobes. Complete results and discussion of implications will be presented.

References

- Cockburn, J. (1995). Task interruption in prospective memory: A frontal lobe memory? *Cortex*, 31, 87-97.
- Einstein, G. O., and McDaniel, M. A. (1990). Normal aging and prospective memory. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 16, 717-726.
- Kvavilashvili, L. (1992). Remembering intentions: A critical view of existing paradigms. *Applied Cognitive Psychology*, 6, 507-524.