Calibrating the usage of working memory for prospective remembering

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Introduction: Prospective memory

How do we remember to execute a specific goal at the appropriate time despite busily pursing other plans?

Theories of cognitive control and prospective memory (PM) suggest that I can either use proactive control (to actively maintain goal information in working memory — e.g., to mentally rehearse “stop at the library”), or I could use reactive control (to rely on on-line retrieval of goal information from episodic memory — e.g., seeing the library on the way home reminds me to stop).

The flexible choice of strategy for a particular goal involves effort/performance trade-offs that depend on the availability of cognitive resources and the likelihood of goal retrieval.

Prior work used fMRI pattern classification to identify strategy choice on a trial-by-trial basis. Suboptimal strategy choice was associated with lower performance on a PM task.

Can we guide participants’ allocation of cognitive resources and improve prospective remembering?

Task design and behavior

We developed a prospective memory paradigm for fMRI consisting of a picture target detection task (faces & scenes) embedded in an ongoing 1-back task (direction of motion).

Target detection task (pictures)
A small set of homogenous pictures are presented within and across blocks. Logical high proactive interference (attenuation of episodic memory retrieval) favors proactive control over working memory-based strategies.

Two tasks are performed simultaneously

Target activation before the target reappears predicts prospective memory accuracy

The target is proactively maintained in working memory throughout the trial.

Dissociable neural routes to successful prospective memory.


Behavioral and neural data regarding prospective remembering

Prospective Memory Cost

References