

Encoding the future: Successful processing of intentions engages predictive brain networks

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Abstract

Evidence from cognitive, patient and neuroimaging research indicates that "remembering to remember" intentions, i.e., prospective memory (PM) retrieval, requires both general memory systems involving the medial temporal lobes and an executive system involving rostral PFC (BA 10). However, it is not known how prospective memories are initially formed. Using fMRI, we investigated whether brain activity during encoding of future intentions and present actions differentially predicted later memory for those same intentions (PM) and actions (retrospective memory). We identified two significant patterns of neural activity: a network linked to overall memory and another linked specifically to PM. While overall memory success was predicted by temporal lobe activations that included the hippocampus, PM success was also uniquely predicted by activations in additional regions, including left rostrolateral PFC and the right parahippocampal gyrus. This finding extends the role of these structures to the formation of individual intentions. It also provides the first evidence that PM encoding, like PM retrieval, is supported by both a common episodic memory network and an executive network specifically recruited by future-oriented processing. (C) 2009 Elsevier Inc. All rights reserved.