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ANTERIOR HIPPOCAMPUS ORCHESTRATES SUCCESSFUL ENCODING AND RETRIEVAL OF NON-RELATIONAL MEMORY: AN EVENT-RELATED FMRI STUDY

T. Kircher

Dept of Psychiatry, University of Marburg, Marburg, Germany

Episodic memory encoding and retrieval processes have been linked to different neural networks. However, the common brain regions associated with non-relational memory processing during successful encoding (subsequent memory effect) and successful retrieval (recognition effect) have not yet been investigated. Further, the majority of functional imaging studies have been conducted in young subjects, whereas patients from lesion studies, where most neuropsychological models are still based upon, are usually older. Inferences from younger subjects cannot necessarily be applied to the elderly, an issue becoming particularly relevant with our ageing society. Using an event-related fMRI approach we studied 29 healthy elderly subjects (mean age 67.8, SD 5.4 years) with a non-associative task of intentional word list encoding and retrieval. For each subject, behavioural responses were individually classified into four event types (hits, misses, false alarms, correct rejections). Brain areas activated during successful memory encoding comprised the anterior left hippocampus extending into the surrounding parahippocampal gyrus. Regions associated with successful memory retrieval involved a widespread network of anterior left parahippocampal gyrus, bilateral temporal cortices and bilateral ventral and dorsal prefrontal areas. Regions contributing to both successful encoding and retrieval, evidenced by a conjunction analysis, revealed prominent left lateralized activations of the anterior hippocampus and the inferior parietal lobe. Our results indicate that the anterior left hippocampus plays an important role during successful memory encoding and during successful memory retrieval in a task of simple, non-associative wordlist learning in healthy elderly subjects.