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Feature binding as an indicator of early cognitive decline in dementia

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Statement of the Problem: Early cognitive changes in people at risk of developing dementia may be detected using behavioral tests that examine the performance of typically affected brain areas, such as the hippocampi. An important cognitive function supported by the hippocampi is memory binding, in which object features are associated to create a unified percept. The purpose of this research is to compare Visual Short-Term Memory (VSTM) binding performance for object names, locations, and identities between a participant group known to be at higher risk of developing dementia Mild Cognitive Impairment (MCI) and healthily aging controls.

Methodology & Theoretical Orientation: Ten MCI and 10 control participants completed five VSTM tests that differed in their requirement of remembering bound or unbound object names, locations, and identities, along with a standard neuropsychological test (Addenbrooke's Cognitive Examination [ACE]-III).

Findings: The performance of the MCI participants was selectively and significantly lower than that of the healthily aging controls for memory tasks that required object-location or name-location binding. A follow up control study with young (n=36) and normally aging (n=36) older adults showed relatively a less significant performance difference between the age groups.

Conclusion & Significance: Tasks that measure unimodal (object-location) and cross-modal (name-location) binding performance appear to be particularly effective for the detection of early cognitive changes in those at higher risk of developing dementia due to Alzheimer's disease.

Biography

Raju Sapkota has expertise in studying human visual short-term memory in healthy participants and in cognitively and visually impaired patients. He has published a number of research papers in peer-reviewed journals on this topic (Sapkota, Pardhan, & van der Linde, 2016; Sapkota, Pardhan, & van der Linde, 2015; Sapkota, van der Linde, & Pardhan, 2015; Sapkota, Pardhan, & van der Linde, 2013; Sapkota, Pardhan, & van der Linde, I., 2011a; Sapkota Pardhan, & van der Linde, 2011b), which have received considerable attention from researchers from around the world. His recent work has led to the development of new visual short-term memory tests as possible early biomarker for dementia. These tests have been piloted on a small cohort of patients with mild cognitive impairment (who are at an increased risk of developing dementia) and healthy controls and have been published (Sapkota et al. 2017).

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