JoCN Forum

Biomarkers of Strategy Use in Cognitive Ageing: Insights from Neural and Eye Movement Data

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Published on: May 08, 2026

URL: https://jocnf.pubpub.org/pub/7yfmdxjx

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Proceedings of the 2026 Annual Meeting of the Cognitive Neuroscience Society

Poster Presentation

In visual working memory (VWM) tasks, both the encoding and maintenance of information engages the dorsolateral prefrontal cortex (DLPFC). However, activation within this network varies with age, where older adults may exhibit reduced lateralisation and less efficient prefrontal activity. To compensate for age-related declines in more specialised regions, the brain may recruit additional prefrontal resources to strengthen existing connections – a process referred to as 'scaffolding'. Cognitive strategies such as prioritising certain information may serve as one such compensatory mechanism. Yet, despite its theoretical importance, the influence of strategic approach on neural activation in ageing remains underexplored. To address this, we combine functional near-infrared spectroscopy (fNIRS) and eye-tracking to investigate: (1) general age-related differences (younger vs. older adults) in prefrontal activation during a VWM task, (2) the impact of instructing prioritisation and verbalisation strategies on behavioural performance, prefrontal neural activity and eye movement patterns, and (3) the relationships between behavioural performance, prefrontal neural activity and eye movement patterns in both age groups. Importantly, we employ realistic, real-world object stimuli generated by artificial intelligence, enhancing ecological validity beyond standard laboratory paradigms. By integrating multimodal measures of brain and behaviour, this research aims to uncover how strategic processes and compensatory mechanisms affect young and older adult's visual working memory performance.