

Age-related changes in motor-cognitive dual-tasking: An electrophysiological investigation of interference at the level of sub-task elements

ABSTRACT:

Continuous sensorimotor coordinations (CSCs) such as driving, walking, using control interfaces, or maintaining the body's balance are often performed alongside cognitive tasks involving attention and executive function (EF). Such dual tasks can mutually interfere, particularly in older adults, but the timing, direction and reciprocity of interference are not yet understood at the level of task components. This project's two experiments compared the chronometry of dual task interference between a visual oddball task and a continuous visuomanual tracking task in young and older adults. The oddball task's components and their cortical resourcing were identified using EEG, and tracking deviations reflected perturbations to state monitoring in the CSC task. Despite instructions to give equal priority to both tasks, older participants tried to maintain resourcing of the oddball task whereas young participants reduced resourcing to accommodate the demands of the tracking task. As a result, older adults' tracking deviation lasted longer. The older group's tendency to reserve resources for oddball operations persisted even when increased EF load in the second experiment reduced their oddball task resourcing and performance and increased both groups' tracking deviations. Notably, this resource reservation tendency was anticipatory in nature as it was detectable earlier in the trial timeline than the EF loading component itself. These detailed chronometric results clarify that age-related amplification of CSC-cognitive interference is largely due to greater inflexibility in task prioritization. Prioritization of the cognitive task over the CSC in this type of dual tasking may have safety implications in everyday task settings.

Keywords

Dual tasking, Sensorimotor coordination, Event-related potential, Attention, Executive function, Electrophysiology

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