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Neural Correlates of Hand Representation in Virtual Flight Simulation

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Abstract

Virtual reality environments provide valuable opportunities for cognitive scientists to investigate complex cognitive functions in ecologically valid environments. For example, it is unclear if visual representation of the users body is required to evoke optimal performance. This study examined the effects of hand representation in a virtual flight simulation using behavioural and biometric data. Event-Related Potentials, Event-Related Spectral Perturbations, and mental workload responses were measured using wireless electroencephalography across the hand presence conditions. Workload indices and neural activity in the parietal region was not significantly affected by the presence of hands, yet lower alpha levels were found across all cortical regions. Findings are relevant to cognitive scientists as they show that the virtual representation of hands is important as it increases task engagement, while not taxing mental workload or spatial processes in the brain.