

Effects of galvanic vestibular stimulation on non-spatial cognitive functions in healthy participants

Corina G. Schöne^{1,2}, & Fred W. Mast^{1,2}

¹Department of Psychology, University of Bern, Switzerland

²Center of Cognition, Learning and Memory, University of Bern, Switzerland

There is growing evidence that cognitive deficits in peripheral vestibular patients are not limited to spatial cognitive domains. Deficits seem to be present also in non-spatial cognitive tasks such as executive functions. Executive functions are comprised of several distinct components, and it is important to know which of those components are affected by vestibular impairment. Further, it is not clear whether executive deficits are causally linked to vestibular impairment. We used the method of galvanic vestibular stimulation (GVS) to induce mild vestibular impairment in healthy participants. Fifty-four participants solved two executive tasks (n-back task and Stroop task), assessing core components of executive functions (working memory, inhibition and cognitive flexibility). These tasks were solved twice, before and during simultaneous bilateral bipolar GVS. The stimulation protocol was varied between participants: The participants were either exposed to suprathreshold GVS (2mA, comparable to mild vestibular impairment), subthreshold GVS (0.8mA) or sham GVS (0mA). Results indicate that participants receiving suprathreshold GVS got worse in performance of working memory compared to participants receiving subthreshold or sham GVS. Conversely, performance in inhibition and cognitive flexibility was comparable between groups. These results indicate deficits in specific executive functions due to vestibular impairment. This finding has clinical potential: It might be reasonable to screen patients with peripheral vestibular loss for impairments in specific executive tasks. In addition, cognitive training could target specific executive components to support rehabilitation.