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Poster #32: Body & Sensorimotor Integration (8)

Visual Capture of Gait in Redirected Walking

Yannick Rothacher, Anh Nguyen, Bigna Lenggenhager, Andreas Kunz, Peter Brugger

First author address: University Hospital of Zurich , Zurich, Switzerland. First author email: yannick.rothacher@usz.ch

Introduction: *Redirected walking is a technique that allows users of virtual reality applications to explore virtual environments larger than the available physical space. This is made possible by manipulating the walking trajectory of users through visual rotation of the virtual surroundings, without the user noticing the interference. In addition to its technical and applied relevance, redirected walking is an attractive paradigm to investigate human perception and locomotion. Both for applied and fundamental research an important yet unsolved question is, how individual differences influence perceptual thresholds. The investigation of these differences can help improving virtual reality applications while deepening our understanding of how humans process multisensory conflicts during locomotion.*

Methods: *In an explorative study with 60 healthy participants (age 18-35) we determined individual redirected walking detection thresholds ("redirection thresholds"), using a Bayesian adaptive method for threshold estimation. Participants also underwent comprehensive cognitive testing and an assessment of psycho-physical traits. Tests included visual-dependence measurements in various contexts (rod-and-frame task, assessment of the Romberg quotient, measurement of vection susceptibility), but also addressed non-visual body perception and control (blind veering, balance stability, interoception, somatosensory amplification). We used a linear mixed model procedure, accounting for participants as a random factor, to analyze the relation of test performances with individual redirection thresholds.*

Results: *When testing the assessed test performances univariately, a positive relation of individual redirection thresholds with the performance in the rod-and-frame test and with vection onset-time emerged. A negative relation with redirection thresholds was found for the Romberg quotient and blind sway. When combining the tested variables together in a mixed model, only the effects of the rod-and-frame test performance and the Romberg quotient remain significant.*

Discussion:*Our results allow to pinpoint the neuropsychological factors associated with an individual's sensitivity to detect manipulations of gait while walking in a virtual reality environment. Of all tested variables, performance in the rod-and-frame test showed the most prominent association to redirection thresholds. Specifically, the more visual dependent a participant was in the rod-and-frame task, the worse he/she performed at detecting redirected walking manipulations. This result supports the view that visual dominance over body-related signals constitutes a "visual capture of gait", which hampers the detection of any locomotor perturbation.*

References: *Nescher T et al. 2014 IEEE Symposium on 3D User Interfaces (3DUI). (2014) 111-118.*

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