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Spontaneous postural instability predicts susceptibility to smooth vection

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Abstract

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Abstract

Do individual differences with regard to the weighting of vision in the control of postural stability help identify persons who are more or less susceptible to vection (visual illusions of self-motion)? In this experiment, we measured the postural sway of standing subjects by quantifying the excursions of their center of foot pressure (CoP). Prior to exposing them to any optic flow, we measured their spontaneous postural sway with eyes open and eyes closed (CoP changes over 60-s periods were converted into sway path estimates). Subjects were then shown two types of optic flow: radially expanding optic flow (simulating constant velocity forwards self-motion) and vertically oscillating radially expanding optic flow (simulating constant velocity forwards self-motion combined with vertical head oscillation). These computer-generated displays, which subtended a visual angle of 66 deg x 62 deg, were rear projected onto a flat screen 0.65 m in front of subjects. As expected, adding simulated vertical viewpoint oscillation significantly increased the vection induced by radially expanding flow. We found that greater differences between spontaneous sway with eyes open and eyes closed significantly predicted higher vection strength ratings for purely radial flow, but not for vertically oscillating flow. Thus, it appears that the importance of vision for postural stability predicts vection strength for displays which represent smooth self-motion, but for oscillating displays, other factors, such as visual-vestibular interactions, may be more important.

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