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2008

Visual perception of smooth and perturbed self-motion

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Publication Details

Allison, R., Zacher, J. E. & Palmisano, S. A. (2008). Visual perception of smooth and perturbed self-motion. Canadian Space Agency: Life and Physical Sciences Workshop (pp. 21-21). Canada: Canadian Space Agency.

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Abstract
Successful adaptation to the microgravity environment of space and re-adaptation to gravity on earth requires recalibration of visual and vestibular signals. Despite decades of experimentation, motion sickness, spatial disorientation, reorientation illusions and degraded visuomotor performance continue to impact the availability and effectiveness of astronauts. We have found that incorporating jitter of the vantage point into visual displays produces more compelling illusions of self-motion (vection), despite generating greater sensory conflicts. We will discuss a series of ground-based experiments that examine a range of possible explanations for this phenomenon. Recent neuroimaging and neurophysiological data suggests that accelerating optic flow stimulisuch the jittering optic flow used in our researchmay result in suppression of signals in vestibular cortex. Such visual modulation of vestibular signals is potentially important to understanding the initial response and adaptation to microgravity. Currently it is unclear what role gravity plays in the potentiation of vection with jittering optic flow. Ground and space based experiments will provide a unique opportunity to explore the jitter effect during periods of adaptation to altered gravity and to complement other research looking at vection on ISS. Our goals are to understand the role of gravity in jitter-enhanced vection, to develop the theory of how vestibular and visual signals are recalibrated in altered gravity and to study the time course of this adaptation.

Keywords
visual, smooth, perturbed, self, motion, perception

Disciplines
Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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