

## CYBERSICKNESS FOLLOWING REPEATED EXPOSURES TO DOME AND HMD VIRTUAL ENVIRONMENTS

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Virtual environments (VE) offer unique training opportunities, including training astronauts to preadapt them to the novel sensory conditions of microgravity. However, one unresolved issue with VE use is the occurrence of cybersickness during and following exposure to VE systems. Most individuals adapt and become less ill with repeated interaction with VEs. The goal of this investigation was to compare motion sickness symptoms (MSS) produced by dome and head-mounted (HMD) displays and to examine the effects of repeated exposures on MSS. Sixty-one subjects participated in the study. Three experimental sessions were performed each separated by one day. The subjects performed a navigation and “pick and place” task in either a dome or HMD VE. MSS were measured using a Simulator Sickness Questionnaire before, immediately after, and at 1, 2, 4 and 6 hours following exposure to the VEs. MSS data were normalized by calculating the natural log of each score and an analysis of variance was performed. We observed significant main effects for day and time and a significant day by time interaction for total sickness and for each of the subscales, nausea, oculomotor and disorientation. However, there was no significant main effect for device. In conclusion, subjects reported a large increase in MSS immediately following exposure to both the HMD and dome, followed by a rapid recovery across time. Sickness severity also decreased over days, which suggests that subjects become dual-adapted over time making VE training a viable pre-flight countermeasure for space motion sickness.