INVESTIGATING THE IMPORTANCE OF STEREO DISPLAYS FOR HELICOPTER LANDING SIMULATION

Dr. Marc Winterbottom

ABSTRACT

U.S. Air Force medical vision standards currently establish a minimum level of depth perception and ocular alignment. These standards apply not only to pilots but also to aircrew with scanner duty, which applies to aircrew involved in clearing aircraft for landing. This has been especially important since an accident in 1998 involving two H-60 aircraft that collided, where poor depth perception was identified as a contributing factor. However, similar standards do not apply for Army personnel in similar positions, and many other countries do not test for depth perception and ocular alignment even for pilots. Further, although much research has been conducted to examine the importance of stereo acuity and stereo displays in a wide variety of tasks, the results are mixed. The objective of the research presented here was to examine the effect of both stereo acuity and stereo displays on the performance of a helicopter landing task. For this research a representative task was selected in which subjects were required to discriminate the distance between the rear wheel of the aircraft and the top of an object over which the aircraft hovered. The simulation was constructed using the X-Plane software running on a pair of Windows PCs and viewed using a helmet mounted display. A unique aspect of this research is that observer stereo acuity, fusion range, and contrast sensitivity were thoroughly evaluated prior to participation. The results of the first evaluation indicated that observers with good stereo acuity scores performed significantly better on the operational task when stereoscopic video was used relative to monoscopic video. The results of the second evaluation indicated that operational performance could be predicted from a combination of vision test scores, but that stereo acuity test scores did not predict performance when used in isolation.

BIO

PRIMARY AUTHOR

Dr. Marc Winterbottom is a senior research psychologist supporting the Operational Based Vision Assessment Laboratory at the U.S. Air Force School of Aerospace Medicine, Wright-Patterson AFB, Ohio. His most recent research focuses on U.S. Air Force vision standards and modernization of vision screening practices. His prior research focus at the Warfighter Readiness Research Division, Mesa, Arizona, was on visual perception, particularly as it related to display technologies for simulation and training applications. He received an MS in Human Factors Psychology from Wright State University (2000) and a BA degree in Psychology from Purdue University (1996). He was awarded a DoD SMART Scholarship in 2010 and recently completed a PhD in Human Factors Psychology at Wright State University (2015).