The enhancement of spatial learning in virtual environments

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Abstract

Six experiments on interaction with virtual environments (VEs) are described. The first three concerned fine hand perceptual-motor movements, and demonstrated that participants had great difficulty in performing a virtual version of a task that created few difficulties in the real world. Three other experiments concerned whole body navigation in a VE and the transfer of navigational knowledge from the VE to the real world. It was found that participants did acquire spatial knowledge that they could use in the real world from VE navigation, but that navigating a VE did not produce superior spatial learning to studying a map. The possible roles of embodiment, complexity, activity and attention are considered.

Fine visuo-motor skills experiments

The work in this area originated with a chance discovery by one of the authors (SP) while attempting to create a general purpose tool to investigate collaborative action in a VE. The virtual task that was used was a version of the old fairground game where people have to pass a hoop over a metal wire without touching it. Though the task was expected to be reasonably demanding, it was not anticipated that it would be quite so difficult. It was therefore decided to investigate the phenomenon in greater detail in a series of 3 experiments. Two versions of the hoop and wire game were built: a real version made of copper wire and a computer generated virtual one. If the hoop touched either wire, a buzzing noise was produced which indicated that an error had been made.

Method

Participants (n = 10) took part in both virtual and real versions of the task. In the virtual task participants wore a Virtual Research V8 HMD, which had a resolution of 640 x 480 pixels, each generated by a triad of RGB leds. The image was presented on a pair of 1.3 inch-diagonal active matrix liquid crystal displays with a 60 degree diagonal field of view. The inter-pupilliary distances ranged between 52 and 74 mm and were adjusted to suit the wearer using controls on the front of the HMD. The

In D. de Waard, K.A. Brookhuis, S.M. Sommer, and W.B. Verwey (2003), *Human Factors in the Age of Virtual Reality* (pp. 107 - 117). Maastricht, the Netherlands: Shaker Publishing.