

RAVE-08 Abstract

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Minimal Cues for Presence in Immersive Virtual Environments

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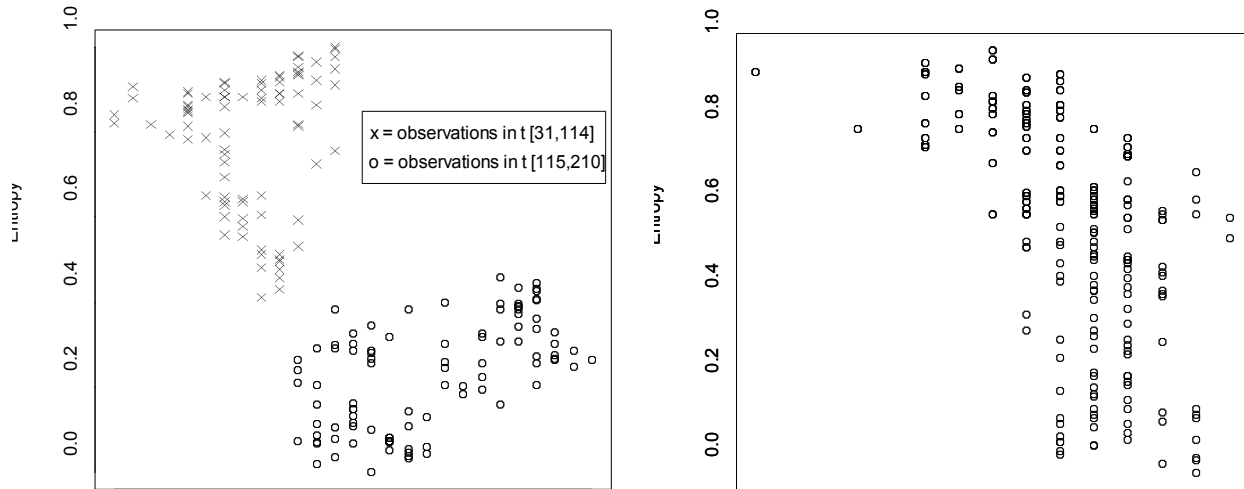
Abstract

The concept of Minimal Cues has been proposed to explain why even low fidelity immersive virtual environments (VEs) contain sufficient cues to invoke a sense of presence in the virtual world.

Presence research literature often focuses upon the effects that increased fidelity may have to facilitate a sense of presence [Govil et al. 2004; Zimmons & Panter 2003; Slater, Usoh, Chrysanthou 1995]. However, even low-fidelity virtual environments can induce a sense of presence, and so it has been suggested [Slater 2002] that in general there might exist a threshold above which there are sufficient perceptual cues to attain a sense of presence. In this work we attempt to find evidence of such a threshold, which we have dubbed the 'minimal cues' threshold.

Here we show evidence that there is indeed such a threshold, by demonstrating that a distinct switch in the entropy of gaze scanpaths occurs at the moment that a virtual environment is perceived as a meaningful space. A meaningful space is deemed to be one that is perceived via 'top-down' processes; as described by the theories of R. Gregory [1998] and Noton & Stark [1971]. This 'switch' in perception is correlated with a switch to a sense of presence as demonstrated by a correlated change in electrodermal activity, indicating increased arousal (Figure 1). In the experimental study an environment forms randomly, and in one condition participants were finally standing on top of a high column, and in the other at ground level. At the time that the gaze scanpath entropy dropped ($n=8, p\text{-value}=0.036$) the number of skin conductance responses per unit time increased ($n=8, p\text{-value}=0.004$) for those in the high column environment, but skin conductance responses did not increase in the ground level environment (ns). In a third condition no meaningful environment developed, and for this condition there was no significant change in gaze scanpath entropy (ns).

This finding appears to confirm the idea that minimal cues for presence do exist, and this knowledge adds to our fundamental understanding of the presence phenomenon. We believe that further investigation into what constitutes minimal cues is worthwhile, justified both from the point of view of perceptual science, and engineering of better virtual environments.



(a) High Column Environment

(b) Ground Level Environment

Figure 1. Mean entropy vs. SCR (standardised), suggests two distinct clusters in (a)

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