

## (26) Physiological Responses to Breaks in Presence: A Pilot Study

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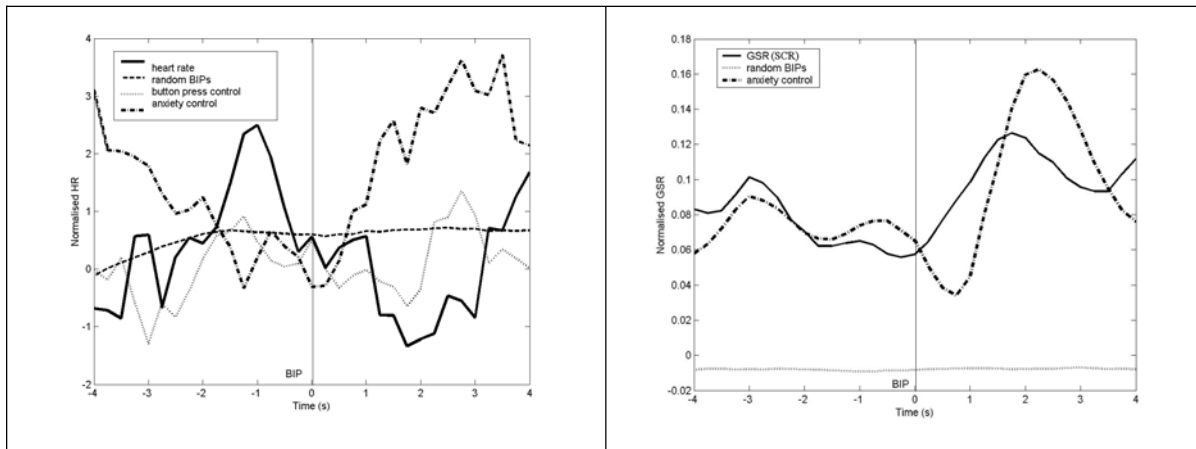
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### Abstract

#### Introduction

A participant in an Immersive Virtual Environment (VE) is subject to two streams of sensory data – from the real world in which the experience is taking place, and also from the virtual world displayed by the virtual reality system. A 'break in presence' (BIP) occurs when the participant stops responding to the virtual stream and instead responds to the real sensory stream. We examine whether BIPs correspond to real changes in physiological state that are detectable in physiological time series. We report on the results of an experiment where subjects reported BIPs in the same way as in Slater & Steed (2000) and where Skin Conductance Response (SCR - GSR) and heart-rate (HR) data were recorded using a ProComp+ device. We find that the evidence does not contradict the hypothesis that BIPs are observable as events in the SCR and HR time series. The evidence was based on 60 subjects for whom heart rate was recorded and 20 for whom SCR was recorded.



#### Results

The graphs above show the mean averaged waveforms within  $\pm 4$  seconds of a BIP, for both heart rate and SCR. For both heart rate and SCR there is a spike either just before or just after the BIP, a pattern which is not reflected in various control conditions, except that related with anxiety.

Slater, M. & Steed, A.J. (200) A virtual presence counter, *Presence: Teleoperators and Virtual Environments*, 9(5): 413-434.