

# Habituation of virtual simulation sickness: preliminary results

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## Abstract

Immersion in a Virtual Environment (VE) is known to produce symptoms similar to those of motion sickness, termed 'Virtual Simulation Sickness' (VSS), and there is evidence that people adapt or, more accurately, habituate to the effects. We aimed to quantify this habituation by immersing 70 people on ten occasions each. Ten subjects were exposed every day, ten more every 2, 3, 4, 5, 6 and 7 days, by playing a PC racing game viewed through a non-tracked Head Mounted Display for 20 minutes. Participants rated motion sickness symptoms both before and after exposure, and also rated their level of malaise at one-minute intervals during this immersion period. All sets of participants reported significantly less VSS symptoms after completion of the ten trials. The habituation which occurred was of a similar nature in all of the participant groups, and thus it appears that the number of exposures is a more important factor than the time interval between them.

## Introduction

Immersion in a Virtual Environment (VE) is known to produce symptoms similar to those of motion sickness (Regan & Price, 1994; Howarth & Costello, 1997a; Howarth & Finch, 1999; Nichols & Patel, 2002). This has been termed Virtual Simulation Sickness (VSS) to differentiate it from the sickness brought about by the use of mechanical simulators. VSS has many of the associated symptoms of motion sickness, such as disorientation, dizziness, headaches and nausea, despite the lack of any true motion to elicit them. However, additional symptoms, such as eyestrain, are often reported.

During repeated exposure to VEs, it has been reported that 'adaptation' occurs, seen as a reduction in the level of VSS (Regan, 1995; Biocca & Rolland, 1998; Welch, 2002). Adaptation is a rapid response to changes in the environment, which is followed by a return to the original state when the environmental change is reversed. For example, in dark adaptation the eye's sensitivity increases as a consequence of the reduction in light level, but as soon as the light level increases the eye returns to its normal state. Hill and Howarth (2000) refer to *habituation*, rather than adaptation, to describe the effects of repeated exposure to VEs. Habituation is a process whereby the response to the same stimulus lessens with repeated presentations, and this is