

Development and Evaluation of a Virtual Test Environment for Performing Reaction Tasks

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Abstract

Virtual reality offers many advantages for standardized experimental setups as well as for manipulating selected parameters. This study describes the development of a three dimensional virtual environment for sports as well as the evaluation of its effectiveness by means of a comparative test. The test consists of measuring the participants' (n=33) mean simple reaction times (\overline{RT}) of an appearing ball in a real, a two dimensional and the developed virtual environment. To assess the participant's sensation of reality in the two dimensional and virtual environment, a short-questionnaire was used. Simple reaction times were measured by accelerometers fixed onto the participant's wrist. The results of the ANOVA and post-hoc analysis (Bonferroni) showed a significant difference ($p < 0.001$) of \overline{RT} between each environment. \overline{RT} between real environment (188ms (± 37 ms)) and virtual environment (286 ms (± 69 ms)) was 53% lower than between real and two dimensional environment (373 ms (± 68 ms)). Results of the questionnaire showed that the majority of participants had a higher sensation of reality in the virtual environment than in the two dimensional environment. This leads to the conclusion that the virtual environment evokes a more realistic behavior than the two dimensional environment which is important for research and training in sports.

KEYWORDS: VIRTUAL ENVIRONMENT, CAVE, SPORTS, REACTION TIME