

Affective and behavioral responses to a virtual fear elicitation scenario

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Research status

In the last decades, the study of emotion has been aided by numerous developments of standardized stimulus materials and procedures, aiming at eliciting emotion changes in participants. In the recent years, this has been an increasingly active area of inquiry. This set of procedures, called "Mood Induction Procedures" (MIPs), includes numerous stimulus sets consisting of pictures, film-stories, sound & music tracks, self-statements or Velten procedure, imagination, gift, feedback, social interaction, facial expression and various combinations of these. However, these traditional MIPs present three limitations: (a) inconsistency of effectiveness or success rate according to the MIPs used, (b) the intensity of the induced moods require long duration of the induction effects, and (c) the range of induced moods is quite limited. Recently, Virtual Reality (VR) studies have been conducted to overcome some of these limitations and to explore the efficacy of emotion induction in virtual environments (VE).

Background/Problem

The purpose of this study was two-fold. First, it sought to elicit fear emotion using VR and to examine the efficacy of virtual fear stimuli in subjective responses of anxiety, affect and emotion in participants. Secondly, this study directly investigated the impact of the virtual fear stimulus on "real-time" behavioral responses in healthy volunteers.

Method/Tools

Participants

A total of 15 participants (8 women, 7 men) between the ages of 18 and 23 years, studying for a degree in Sports Sciences at the University of Aix-Marseille II were recruited on a voluntary basis.

Virtual fear elicitation scenarios

A Computer Automatic Virtual Environment (CAVE) scenario was designed to elicit a feeling of fear in participants during a locomotion task. During this task, participants were seated in the CAVE and were instructed to move using a virtual wheelchair inside the building of the Sport Sciences Faculty (SSF) of Marseille, in order to retrieve a document in the printer located in the reprography room and to drop it on the desktop located in the meeting room. Their displacement with the virtual wheelchair inside the virtual building was controlled using a joystick. Two scenarios (i.e., neutral and Fear elicitation) were developed using Virtools[®] software.

Affective measures

The Spilberger's Trait-State Anxiety Inventory – Y form (STAI-Y), the Positive and Negative Affect Schedule (PANAS), the Self-Assessment Manikin (SAM) and the Emotional Self-Rating (ESR) were administered to participants to respectively assess their : (a) state anxiety, (b) positive and negative affect, (c) the valence and arousal of emotion, and (d) their feelings on six fundamental emotions.

Behavioral and performance measures

During the experimentation, different performance and behavioral indicators were recorded during each scenario: (a) total time spent for task completion and time spent in each corridor, (b) mean speed during overall task completion and in each corridor, (c) precision of the locomotion task during task completion and in each corridor, and (e) reflexive movement of the participants in the CAVE.

Procedure

Upon arrival, participants were asked to read and sign an informed consent form. Before the beginning of the experiment, the computer version of the STAI-Y, PANAS, SAM and ESR were presented individually to participants, and then they performed one training session in the neutral scenario in order to learn how to use the joystick as a locomotion interface.

During the experimentation, all participants performed the neutral scenario first, and then the fear elicitation (FE) scenario. Before, between and after each trial, the participants were allowed to stay at rest for 5 min. The computer version of the STAI-Y, PANAS, SAM and ESR were systematically represented individually to participants in the same standardized conditions immediately after the neutral scenario and the FE scenario.