ABSTRACT

Anxiety is an increasingly common feeling in our society; it can be very debilitating and, if not properly treated, can evolve to more serious health problems. This paper describes a low-cost Virtual Reality solution to support the treatment of social anxiety, more specifically the anxiety of speaking in front of an audience. Our application involves: i) a simulation that takes place in a virtual auditorium inhabited by animated virtual humans with controllable behaviours; ii) an interface which allows the therapist to control these behaviors and a set of features and events of the simulation, inducing different levels of distress in the patients. The use of Virtual Reality environments for the treatment of phobias emerged in the 90s and usually implies expensive special purpose hardware. Our challenge was to conceive a low-cost solution, easy to install and use for people without expertise in informatics.

INTRODUCTION

Anxiety is an increasingly common feeling in our society, affecting a large number of individuals worldwide, diminishing their quality of life. Social Anxiety (SA) is described as a strong and persistent fear of embarrassment in situations that require some type of social performance (DSM-IV, 2000), e.g., speaking in front of an audience. People with SA are concerned about what others might think of them, thus avoiding many social situations, and often resorting to the use of drugs and/or alcohol to be able to face these situations.

Although a certain level of anxiety is natural and can have a positive motivational value, in general, anxiety is difficult to treat and in some cases can be overwhelming and highly debilitating. If not properly treated, it can progress to more serious problems, being classified as an anxiety disorder, sometimes associated with phobic behavior or panic attacks. Social phobia has been considered the third most common mental disorder, with prevalence rates ranging from 5 to 13% (Pinto-Gouveia, 2000).
During the last decades, the non-pharmacological treatment applied to most anxiety disorders and especially in SA, has been cognitive behavioral therapy (CBT), a method of treatment strongly focused on reducing the symptoms and the discomfort experienced by the patient. Despite coexisting different protocols and techniques, exposure to feared situations is a common and essential ingredient.

Following technological developments, an important modality used since the nineties is Virtual Reality Exposure Therapy (VRET). This technique allows exposing patients to simulations of feared situations, even in cases where actual exposure is not possible or difficult (e.g., due to high costs or risks). A Virtual Reality (VR) environment, when applied in the context of therapy may be used as a safe environment in which the subject along with the therapist can train, experience and learn from the feared situations (Botella et al., 2004); it can save time for both the therapist and the patient, because they do not have to travel to in vivo locations, which most probably have to be prepared beforehand, and the simulated situations may be infinitely replicable (Regenbrecht et al., 2004). Moreover, it can be less embarrassing, a valuable characteristic when dealing with social anxiety or social phobia (Bowman & McMahan, 2007), maintaining patient’s confidentiality, factors that contribute positively to the motivation of the latter to undergo the therapy.

Several VR applications have been developed and tested for the treatment of acrophobia (fear of heights), fear of flying, fear of driving, claustrophobia, posttraumatic stress disorder, social phobia, fear of various kinds of animals (e.g., arachnophobia), lack of attention, distraction from pain, eating disorders and many others (Grillon, 2009; Regenbrecht et al., 2006). Several authors, citing their own research or someone else’s work, seem to agree that VR is a valuable tool in treating phobic disorders (North et al., 1996; Brinkman at al., 2009; Powers & Emmelkamp, 2008; Roy, 2003; Klinger et al., 2005).

Concerning the treatment of SA and according to some studies (Klinger, 2004; Herbelin, 2005), the efficacy of exposure therapy with virtual environments is similar to traditional therapy. VRET techniques have become the specialty of clinics and hospitals such as Virtually Better¹, Virtual Reality Medical Center² and Duke University Medical Center³ and are the result of research carried out over many years.

However, there are also disadvantages: the high-cost of the equipment (e.g., head-mounted displays, CAVE) and the side effects experienced by some users, called cybersickness (LaViola, 2000). Cybersickness is a type of nausea resulting from a false sense of movement, when a subject is static while watching a presentation of continuous moving pictures. More specific symptoms are eyestrain, headaches, disorientation and motion sickness.

Our aim was to develop a low-cost and easy-to-use solution that creates simulations to be used in SA exposure therapy. The simulation takes place in a virtual scenario inhabited by virtual humans ( VH) that behave realistically; the therapist has full control over the course of the simulation controlling the distress level induced on the patient.

We explored the capabilities of Blender⁴, a public domain software tool, used for creating 3D animated models and for video games. The simulation is displayed on a projection screen, in perspective and in a manner such that the patient sees the virtual characters in the audience with a size similar to that of their real counterparts; sound is also included in the simulation, so that both senses of sight and hearing are stimulated. The therapist uses an interface to control the simulation, inducing various types of stimuli in patients.

The development of the solution has been closely monitored by a psychologist who has experience in this type of therapy.

This document is organized as follows: next section presents some of the most relevant related work; then we describe our approach and the development stages of both the scenario and the interface. Afterwards we describe the evaluation performed with therapists and finally we draw conclusions and present ongoing and future work.
Polygonal Mesh Comparison Applied to the Study of European Portuguese Sounds

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