Chapter 2
Expressive Avatars in Psychological Intervention and Therapy

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ABSTRACT

A wide range of applications for virtual humans can be envisaged for the needs of both research and intervention in Psychology. This chapter describes the development and preliminary testing of an interactive virtual reality application "Virtual Spectators" – whereby virtual humans with expressive behaviour modelled on the basis of field research in human facial expression in real emotion contexts can be configured to interact with people in an interview or jury. We discuss the possibilities of this application in cognitive behavioural therapy using virtual reality and in nonverbal behaviour.

VIRTUAL REALITY IN PSYCHOLOGY

Information Technologies (ITs) designed for human social interaction are currently living their heyday: daily all over the world, social robots make the news, and when not social robots, then artificial intelligence solutions, or the ever more realistic virtual reality games. These ITs hold so much promise for every field of human life, indeed, but entertainment, sales and industry seem to be those that are currently taking the most advantage of their potential.

A great deal of emphasis for ITs' applications has been put in Health, including Mental Health (e.g. Jarrett, 2013; Maheu, Pulier, McMenamin, & Posen, 2012) for purposes that range from aid in diagnostic to "tele-counselling" to the design of psychoeducational environments for therapy and/or specific skill learning (e.g. Lane, Hays, Core, & Auerbach, 2013).

Two decades ago virtual reality (VR) opened new possibilities for psychological intervention with the generation of virtual scenarios for the desensitization treatment of people suffering from a variety of phobias, such as flying, open spaces or spiders (Glantz, Durlach, Barnett, & Aviles, 1996; North, North, & Coble, 1997; Rothbaum, Hodges, Watson, et al., 1995, 1996), a trend that continues to this day with the implementation of increasingly realistic VR scenarious (e.g. Shiban et al., 2017). But the scope of interventions with VR has widened somewhat with their incorporation into mobile devices, gaming and distance communication technology. The creation of online virtual worlds where people act and interact assuming the role of a customized avatar, such as *Second Life* (url-SecondLife), also provided a venue for research in Psychology, especially behavioural research (Jarrett, 2009). Virtual humans are being increasingly incorporated into interventions in Psychology, including: the assessment of emotion and eating disorders (Gaggioli, Mantovani, Castelnuovo, Wiederhold, & Riva, 2003), the therapy of eating disorders (Gutiérrez-Maldonado, Ferrer-García, Dakanalis, & Riva, 2017), schizophrenic hallucinations (Jarrett, 2013) and exposure-based treatment of phobias (e.g. Baus & Bouchard, 2014; Haworth, Baljko, & Faloutsos, 2012).

The therapy of social phobia has caught our interest and we have been developing over the last five years VR solutions to enable both therapist-conducted and programmed sessions and self-help simulations (Cláudio, Carmo, Pinheiro, & Esteves, 2013; Cláudio, Gaspar, Lopes, & Carmo, 2014; Cláudio, Carmo, Gaspar, & Teixeira, 2015a; Cláudio, Carmo, Pinto, Cavaco, Guerreiro, 2015b).

In this chapter we describe the rational and the developmental stages of an application that was originally designed to interact with people suffering from Social Anxiety Disorder or Social Phobia – a human condition characterized by intense anxiety when the individual faces or anticipates public performance (APA, 2013). The application has a much wider scope of uses – a topic we will discuss towards the end of the chapter.

Virtual Reality and the Treatment of Social Phobia

Social Anxiety Disorder (SAD) is a condition that can be very crippling in the personal, social and professional domains, as those bearing it withdraw from social contact; it also has a high comorbidity with depression (Stein, 2000). People with SAD fear negative social judgments and are hypervigilant for signals in other's behavior, thereby identifying faster and more efficiently than other people facial clues to threatening or negative content (Douilliez, 2012).

Therapy approaches to SAD include medication, relaxation methods, and psychotherapy, mainly Cognitive-Behavioural Therapy (CBT). CBT produces the most efficient and persistent improvements, especially when it is applied as Exposure Therapy (ET) (Beidel & Turner, 2007), which consists in exposing the patient to the feared situation. VR has been used in ET since the early 90's, being called Virtual Reality applied to Exposure Therapy (VRET).

Several studies have concluded that VRET has a positive effect in anxiety disorders (Wortein, 2015) and produces results that are similar to traditional exposure therapy (Klinger, 2004; Herbelin, 2005, Wortein, 2015). VRET allows a precise control over the habituation (and extinction) to the fear of the

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