Interactive Highly Realistic Virtual Reality as a Tool for Understanding the Genesis and Treatment of Psychotic Symptoms

Eva ZÁNYI¹, Elmedin SELMANOVIC², Matthew BROOME³, Silvester CZANNER³, Max BIRCHWOOD⁴, Alan CHALMERS³ and Swaran SINGH³

¹Warwick Medical School, University of Warwick, UK
²International Digital Laboratory, WMG, University of Warwick, UK
³University of Birmingham, UK

Abstract. Schizophrenia can be a devastating lifelong psychotic disorder with a poor prognosis. National guidelines in the UK recommend the provision of cognitive behavioral therapy (CBT) to all those suffering with psychotic disorders, but there is a lack of trained therapists in the UK able to provide such a treatment. Developing high quality automated technologies that can serve as an adjunct to conventional CBT should enhance the provision of this therapy, and increase the efficiency of the therapists in practice. The latter will occur by enabling alternate professionals to aid in the delivery of therapy, to enable behavioral experiments to be conducted in the clinic, and for sessions to be recorded and replayed such that the patient can deliver therapy to him or herself. As such the system will enable patients to become experts in, and providers of, their own treatment and decrease the number of sessions needed to be led by a trained CBT therapist. A key feature of any such system is the level of realism required to ensure a compelling session in which the user is not adversely affected by the system itself. This paper presents a high-fidelity virtual environment to help better understand the environmental triggers for psychosis.

Keywords. Psychosis, schizophrenia, realistic virtual environments, multi-modal

Introduction

Over the last several years it has become clear that the classical neurodevelopmental model of psychotic disorders such as schizophrenia fails to explain both the proximal events that trigger someone with unusual experiences into frank psychosis, and more generally, does not offer a way of understanding an individual’s shifts up or down the continuum of psychosis [1]. On the other hand, Virtual Reality - Cognitive Behavior Therapy (VR-CBT) has been shown to substantially reduce the length of treatment and reduce relapse rates for the treatment of phobias, for example [2]. However, such VR systems have typically been developed for experimental purposes and used avatars and scenes, which cannot be manipulated interactively. They can therefore not be developed into a treatment tool for the variety of relevant contexts used in CBT for schizophrenia [4]. Furthermore, the level of realism of the virtual environment has to

¹ Corresponding Author: Warwick Medical School, University of Warwick, UK; E-mail: e.zanyi@gmx.de.
be carefully considered if the virtual scenes and the avatars are to be able to induce a feeling of presence and thus the same emotional response as in reality [3-6].

1. Methods

The environment used in the system is a highly realistic multi-modal (graphics and audio) virtual urban setting based on an actual street in the deprived area of Handsworth, Birmingham (UK), including both the environment and virtual people (avatars). The user of the system is standing at the bus stop waiting for a bus. The system is delivered with a HMD NVIS nVisor SX and a Polemus 6DOF Motion Tracker (figure 1). The virtual scene is then manipulated by altering parameters. Two scenarios were considered:

- background and a group of elderly ladies in the foreground,  
- background and a group of aggressive young men in the foreground (figure 2).

2. Results

Subjects were students recruited from the University of Warwick. Detailed feedback, both through direct monitoring of user behavior, such as heart rate measurement and skin conductance, and pre- and post-exposure assessments including questionnaires and a semi-structured interview have provided key insights into the efficacy of the virtual environment. We have also been able to identify those environmental factors, which are most likely to be linked to the development of paranoid thinking and conversely, those factors that may attenuate paranoid experiences.

3. Discussion

Psychotic disorders such as schizophrenia carry major social and economic costs for sufferers, their families, and society. Clinical focus is now on early treatment in young people with emerging psychosis. Evidence based psychological interventions such as CBT are often not offered because of a lack of trained therapists. VR environments have typically been used to treat mental health problems such as phobias. A key
question was whether current levels of realism common in typical VR systems were sufficient to investigate psychosis, or whether a more high-fidelity, multi-modal approach was required.

4. Conclusions

The preliminary work presented here has shown that VR exposure can potentially be used to develop assessment and intervention techniques for psychosis. However, the presence of both high-fidelity visuals and audio was necessary to help trigger psychosis. More work is now needed to further investigate the safety, acceptability and suitability of VR in helping understand early psychosis.

References