Chapter 25
Virtual Reality as an Experiential Tool:
The Role of Virtual Worlds in Psychological Interventions

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ABSTRACT

The present chapter illustrates the past and the future of different virtual reality applications for the treatment of psychological disorders. After a brief technical description of the virtual reality systems, the rationale of using virtual reality to treat different psychological disorders, as well as the advantages that the online virtual worlds offer to the promising field of the virtual therapy will be discussed. However, challenges related to the potential risks of the use of virtual worlds and questions regarding privacy and personal safety will also be discussed. Finally, the chapter introduces the concept of "Interreality", a personalized immersive form of e-therapy whose main novelty is a hybrid, closed-loop empowering experience bridging physical and virtual worlds. The main feature of interreality is a twofold link between the virtual and the real world: (a) behavior in the physical world influences the experience in the virtual one; (b) behavior in the virtual world influences the experience in the real one. This is achieved through: (1) 3D shared virtual worlds; (2) bio and activity sensors (that connect the real to the virtual world); (3) mobile internet appliances (that connect the virtual to the real world).

INTRODUCTION

Virtual Reality (VR) is more than a fancy technology: it is an advanced form of human–computer interface that allows users to interact with and become immersed in a computer-generated environment in a naturalistic way. Using visual, aural or haptic devices, the human operator can move and interact with the virtual world, experiencing

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the environment as if it were a part of the real world. From a technological point of view, VR is made possible by the capability of computers to synthesize a 3D graphical environment from numerical data. Different input devices sense the subjects' reactions and motions, while the computer modifies the environment accordingly, giving subjects the illusion of interacting with, and being immersed in it.

From a psychological point of view, VR can be considered an advanced imaginative system: an experiential form of imagery that is as effective as reality in inducing a wide range of cognitive and emotional responses. As discussed later in this chapter, this feature makes VR an innovative instrument to assess and treat a wide range of mental disorders.

After an introductory description of the technological components of a VR system, the chapter will be organized in two main sections: the first one will explain the rationale of using VR as an advance form of exposure therapy for the treatment of anxiety disorders, while the second part will discuss the potential of the on-line virtual worlds for the creation of shared therapeutic environments accessible by different users who are physically distant one from the others. Pros and cons of the "virtual approach" will be also discussed.

VIRTUAL REALITY: THE TECHNOLOGY

A typical VR system is made of the following components:

Hardware

- **The computational device:** a desktop or a laptop pc equipped with an advanced image graphic card;
- **Different peripheral devices** (visual, aural or haptic devices);
- **A non immersive or immersive image display system:** a screen or a head mounted display (HMD);
- **A motion sensor** (or tracking device), usually integrated in the HMD, that tells the computer where the user is looking at on the basis on his/her head movement;

Software

- *the VR application*, According to the hardware and software included in a VR system it is possible to distinguish between different kinds of virtual settings:
- *desktop VR*, based on subjective immersion: in these systems the feeling of immersion can be improved through stereoscopic vision tools. Users interact with the virtual world using a mouse, a joystick or other VR peripherals such as datagloves;
- *fully immersive VR*: users appear to be fully immersed in the computer generated environment. This illusion is produced by providing them immersive output devices (HMD, force feedback robotic arms, etc.) and a system of head/body tracking to guarantee the exact correspondence and coordination of users' movements with the feedback of the environment;
- *CAVE*: a CAVE is a small room where a computer-generated world is projected on the walls. The projection is made on both front and sidewalls. This solution is particularly suitable for collective VR experiences because it allows different people to share the same experience at the same time;
- *telepresence systems*: users can influence and operate in a world that is real even if they are in a different location. They can observe the current situation with remote cameras and achieve actions via robotic and electronic arms;