Virtual Reality Therapy

Commentary

Virtual Reality (VR) Therapy is one of the emerging and most effective applications of VR technology, where patients are exposed to stimuli in fully controllable environments.

Whether it is immersive, such as a CAVE-like environment (CAVE is a VR device that allows the user to be completely immersed), or non-immersive, such as desktop-like displays, the idea is to recreate a believable artificial environment that stimulates physical responses similar to those of a real environment that can be individually controlled, replicated, and tailored to the patient's experiences. The patient is presented only with environmental features that he or she can control, such as difficulty level, complexity, and amount of stimuli. This enables a highly scalable and controllable environment. In addition, patients are motivated by the novel and entertaining nature of the experience. In some applications, patients can see themselves engaging in various activities with virtual people, and immediate feedback is provided. This improves dramatically the patient's focus and compliance with the activity in therapy.

VR rehabilitation has been successful in various areas of application. In cognitive rehabilitation of persons with acquired brain injury[1] and neurological disorders[2] it has been used in restorative and functional rehabilitation tasks. It has also has been used to test the cognitive mapping abilities of its users and for the enhancement of functional ability, improving sensory, motor, cognitive, and higher level-cognitive functions. A lot of work has been done using VR for anxiety treatment. VR therapy has been successfully used for acrophobia,[3] flying phobia, and driving phobia.[4] VR exposure has been proven to be at least as effective as in vivo exposure, and a better tool than Imagery Exposure Therapy.

Researchers have also developed VR programs that are intended to distract patients and work as a virtual pain relief, e.g. for back pain and for children who are undergoing treatment for cancer. Also, a Virtual Reality-Enhanced Cognitive Behavioural Therapy has been developed to help children with 'school phobia' (or 'school avoidance' or 'school refusal'), and is offered as a tool by medical centres, or to help autistic children, or for children with spatial deficits, and for stroke rehabilitation.[5]

One of the factors that impede wider use of VR therapy, is the cost associated with this method. The CAVE-like equipment needed to experience an immersive synthetic environment is not affordable by the average person or therapist. The use of VR technology in other forms, such as head-mounted or desktop-like displays are, however, becoming more accessible, thanks to hardware and software advances driven by the computer gaming industry. Even in desktop-like solutions there are still costs associated with the development of the graphic and content of the system, although the significant savings in rehabilitation can offset such costs. Also, VR rehabilitation, except for the CAVE-like technology, is portable and easier to distribute. Therapists can take VR equipment around with them and carry out sessions in people's homes. This is particularly useful for patients, like people with agoraphobia, who due to their condition cannot leave their homes. The development of the content is ultimately what makes the therapy work, and should only be developed in close consultation with the therapist. As the success of the therapy often relies on skills learned virtually, it is important that something is not learned in the computer-generated environment that is not applicable to the real world, or that represents a distorted version of reality.

Prolonged immersion in computer-generated worlds causes what is generally referred to as VR sickness. The reported symptoms are vertigo, motion sickness, flashbacks, spontaneous seizures, and excessively nervous and antisocial behaviour. People prone to epileptic seizures also are subject to a condition called 'flicker vertigo' that usually occurs when computer screens are not regenerated at least 15 times per second. This limitation is generally not a problem with the latest displays. VR sickness usually occurs after an exposure of 30 minutes or more. Fortunately, due to the costs associated with the development, it is unlikely that a simulation runs for more than a minute.

Despite the downsides, VR therapy solutions are widely used and promise a lot of benefit for rehabilitation.

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DOI: 10.1017/S0012162205001143

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https://doi.org/10.1017/S0012162205001143 Published online by Cambridge University Press