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Virtual reality therapy

Thoughts of computerized virtual worlds may bring to mind video games or suggest the Holodeck of the Starship Enterprise, which allowed its crew members to create a realistic simulation of almost any conceivable environment. But today the interesting therapeutic use of digital environments is neither a toy nor a science-fiction plot device. This technology could become a practical tool for diagnosing and treating a variety of neurological and psychological disorders. The apparatus most often used in virtual reality therapy is a helmet attached to stereo earphones and goggles that display three-dimensional images provided by a computer graphics workstation. A tracking mechanism in the helmet provides information to the computer about the location, orientation, and movements of the wearer's head.

Virtual reality has been used most effectively in the treatment of phobias. The standard treatment, exposure therapy, presents patients with gradually more frightening objects or environments until they become habituated and lose their fear. Real-life exposure is demonstrably effective, but often inconvenient for both patients and therapists and sometimes more than the patient can tolerate. The most common alternative, simply imagining the frightening situations (imaginal exposure), often fails because it does not generate a strong enough fear response.

Virtual reality therapy has some of the virtues of both these methods. It doesn't leave too much to the imagination, at least approximating the vividness of real-life exposure while preserving the relative ease of imaginal exposure. The patient never has to leave the room where the treatment takes place, and a therapist can even participate from a distance by way of the Internet. And virtual surroundings are much easier to monitor and manipulate than real-life surroundings.

The earliest and most common therapeutic use of virtual reality is in treating fear of heights (acrophobia). Patients using the apparatus are plunged into a series of increasingly anxiety-provoking simulated environments — a moving glass elevator, outdoor balconies or open windows at increasing heights — until they show signs of distress. They remain at each level until the anxiety fades. Studies have found this treatment as effective as real-life exposure, with results that last for at least six months.

Treating the fear of flying is a closely related use. Patients sit in a standard airplane seat and absorb the sights, sounds, and physical sensations of flight. When preceded by breathing exercises, relaxation training, and some cognitive therapy, this treatment has been found to be as effective as real-life exposure and considerably less expensive. It's also been shown to be superior to an "attention placebo" that included education about the mechanics of flight and group meetings in which patients discussed their fear of flying.

Virtual reality has also been used experimentally in the treatment of post-traumatic stress disorder (PTSD). People suffering from PTSD feel a need to avoid reminders of the traumatic experience. By gradually exposing them to situations and sensations reminiscent of the trauma, virtual reality can help them master their anxiety and reduce their avoidance. In one experiment, Vietnam veterans with PTSD were exposed to the sensations of combat while flying a virtual helicopter over rice paddies or walking through a virtual jungle clearing. While immersed in these environments, patients recounted traumatic memories repeatedly until they lost their compelling quality. Patients who received 10 sessions of this treatment were interviewed six months later. On average, their post-traumatic symptoms had improved from severe to moderate and their depressive symptoms from moderate to mild. Now therapists are considering the use of this technique to treat people suffering from psychological effects of the 2001 attack on the World Trade Center.

Researchers are also looking into using the treatment for spider phobias, panic symptoms, and agoraphobia. Another idea, still speculative, is to present schizophrenic patients with virtual hallucinations in order to desensitize them to their own hallucinatory voices or visions. Virtual reality has also been used to help patients with eating disorders get a better understanding of distorted body images.

Patients with severe burns have been distracted with soothing virtual reality environments while they endure the often-excruciating process of changing bandages and stretching skin. One environment is a winter scene with simulated snow, ice, and flowing cold water. Another is a virtual kitchen containing objects the patients can "pick up" as they perform painful stretching motions.

Virtual environments have also been suggested as a way to accustom children with attention deficit disorder to classrooms or help people with schizophrenia and autistic disorders learn how to cope with ordinary social circumstances and perform everyday actions.

Most existing virtual reality environments have a limited capacity for simulating a real-life environment, but the technology is improving rapidly. Advanced computer graphics are permitting displays with a wider visual field, finer resolution, more accurate shading, and more convincing texture. Higher computing power allows faster updating of environmental responses to a person's physical movements. Voice recognition capacity is growing. It's becoming easier for several people to occupy the same virtual environment and interact convincingly. And researchers are learning more about which sensory details and computer responses are most important in creating an experience that seems genuine. Although the Holodeck is pure fantasy, the therapeutic use of virtual worlds is now a reality.

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