ESSAI

Volume 10 Article 26

4-1-2012

Virtual Reality Exposure in Clinical Psychology

Patrick Noonan
College of DuPage

Virtual Reality Exposure in Clinical Psychology

by Patrick Noonan

(English 1102)

In clinical psychology, a strong focus is put towards not only diagnosing and detecting mental disorders, but also in finding the most effective methods to treat them in order to help patients take back control of their lives. In their complex analysis within the unconscious of the human mind, the virtual reality therapy technique has offered a new way to bring a person's innermost thoughts into social awareness. In the years since its introduction to the psychology field in 1990, virtual reality (VR) has aided in the treatment towards a number of debilitating disorders such as phobias, anorexia, post traumatic stress, and even substance abuse. Its success rates found in the countless experiments from which it's been applied makes it apparent that this technology should be a permanent tool within the psychology profession.

The main purpose of the VR technique is to evoke the same emotions that would be experienced in the real world without leaving the safety net provided to them by the therapy or rehabilitation center. What distinguishes VR from typical exposure methods is that "users are not passive, external observers of images on a computer screen, but are active participants within a computer generated, 3-D virtual world" (Riva 71). The effect that it creates for the patient eliminates a common obstacle of control faced by psychologists with participants in their experimentations. When put in a situation of vulnerability, a common reflex for those being assessed is to close off any emotions due to an unwillingness to admit that they have a mental illness. In an entry from the journal of "Cyberpsychology, Behavior, And Social Networking", Maldonado-Gutiérrez et. al. state that "[VR] presents good internal validity, as it allows strict control over the variables [therefore] it overcomes the main drawback of laboratory studies, that is, their artificiality" (522). The interactive nature of VR helps participants to slowly let down their guard with the intense emotions the environment creates thus helping psychologists get to the root of the mental disorder.

The visual accuracy of the interactive 3-D environments that the patient is immersed in makes VR a vital tool in the treatment of phobic disorders. The flexibility of the computer software operating in partnership with VR breaks down any barriers that may exist within the patient and their disease. In their article, "A Randomized, Controlled Clinical Trial of *In Virtuo* and *In Vivo* Exposure for Spider Phobia," Psychologist David Michaliszyn and colleagues from the University of Quebec provide a descriptive overview of the positive effects in virtuo (VR) can bring to phobia treatment:

In virtuo exposure has a number of advantages over conventional therapy, such as: (a) greater control over phobogenic stimuli and thus greater accuracy in inducing anxiety, and the ability for the therapist to repeat exposure at will; (b) limited unexpected events during exposure; (c) exposure to fears that can be difficult to reproduce *in vivo* (e.g., fear of flying, fear of storms) and reduction of costs (e.g., taking the plane); (d) remaining in the clinician's office during exposure facilitates confidentiality; and (e) decreased maintenance associated costs required for animals (hygiene, food, etc.) used for exposure. (689-690).

These listed advantages have enabled experimenters to create an endless amount of risk induced situations ranging from the nausea experienced standing on top of the empire state building, to the anxiety of flying present in acrophobia (fear of heights). These scenarios help to expose patients to the harsh reality that they would face in the outside world, but in actuality, providing them with a sense of security by facing these fears in a safe environment. Even phobias existing on a relatively smaller scale of severity such as arachnophobia (fear of spiders) can also be reduced

through VR. A major program of research reviewed by Michaliszyn et. al. at the University of Québec exposed a recruitment of participants with a long term case of arachnophobia to a series of tasks incorporating the VR method. Utilizing computer software designed in the style of "computer-game environments based on the Max Payne video game", the commonly featured head mounted displays, as well as "a handheld wireless Gyration mouse [used] to control their forward and backward movements" (Michaliszyn et. al. 690), participants were exposed to three virtual environments of increasing intensity that were engulfed with various species of spiders. Results showed that "several patients in the *in virtuo* group indicated that they were curious to know how they would react to a spider in their natural environment" (694). These studies indicate that VR not only provides phobia sufferers with a new alternative in facing their fears, but it also helps them to develop a new point of view towards the former triggers that once plagued their lives.

VR's ability to bridge the gap between reality and actuality make it a useful treatment alternative for those suffering from post traumatic stress disorders (PTSD) in coming to terms with the delusional fears that dominate their lives. In PTSD, effective treatment involves not only changing one's mindset, but also altering the gap between the past and present. The "5.2 million US adults ranging in age from 18 to 54" (Gamito et. al. 43) that are affected by this disorder, exhibit unpredictable episodes based upon past traumatic events that results in constant nightmares, intense flashbacks, and severe anxiety. The most highly documented affects of PTSD have been found within war veterans, "warfare is one of the severest due to the physical, emotional, cognitive, and psychological demands of the combat environment" (Gamito et. al. 43). VR therapy gives these veterans the ability to pinpoint each specific area of the event that has heavily affected their everyday functioning and allows them to finally face it head on.

To achieve this task, authenticity within the controlled virtual environment is vital, especially when dealing with the strong emotions felt by the war veterans. In order to re-create such a sensitive area as the battle grounds from the soldier's past, VR's software is used to it's full potential. One in particular is the Hammer graphics editor (Gamito et. al. 44), a common editing tool for video games and other graphic data. Using this accompanied with the "Z800 head mounted display" (Gamito et. al. 44), experimenters are able to add every small but crucial detail in the environment such as the "footpath surrounded by dense vegetation, where the participants [can] follow a column of virtual soldiers" (Gamito et. al. 44) that gives them the feeling of actually being back in the action of the battle field reliving their military experience. Added to the virtual stimuli are background and interaction cues that separate the presence within the war zone and the constraints of the therapy center. The various war cues such as "ambush, sounds of gun[s] firing and tracing bullets" (44). In addition, the interaction with the computer generated soldiers provided by the avatar feature within the software allows for the whole experience to come full circle for the veterans, and it is offered at different levels of intensity to help them steadily adjust the many emotions that they may be feeling at the moment.

One PTSD study involving VR, tested the technology and its equipment capabilities to the fullest. Researchers exposed a group of Portuguese war veterans to "12 graded exposure sessions of VR for the VRET [virtual reality exposure therapy] condition and 12 sessions of imagination exposure for the EI [exposure in imagination] condition" (Gamito et. al. 44). Using the same head display technology and sensory details, patients experienced a variety of anxiety-inducing war elements within the VR scenarios. Results from the study showed that VR "caused a reduction in patients' depression and anxiety levels [and that] after the 12 therapy sessions, the veterans who were exposed to VR cues reported less anxious behavior and reduced depressive symptomatology" (Gamito et. al. 47). The outcomes from this study certified this technology as a new way to treat the disorder, giving veterans the closure that they deserve, freeing them of the painful flashbacks of violence and the guilt that derived from the memories of comrades that they left behind in the heat of the battle.

The interactive stimulation created in the virtual environments has made VR a breakthrough technology when dealing with and detecting eating disorders. When evaluating the consciousness of the mind created by those suffering from an eating disorder, there tends to be wide array of social and mental factors intertwined within the disease. The desire to achieve the perfect self image and the need for constant control creates an ongoing war within their lives. Professor José Gutiérrez-Maldonado and colleagues claim in their 2010 article that "several authors have stressed the close relation between anxiety/depression and ED [Eating Disorder(s)], and a relationship between the presence of a negative mood and an increase in body-image disturbances has often been found." A number of scenarios are created by VR in order to tackle each of the underlying causes behind the disorder as well as "to produce or enhance body-image distortion and body-image dissatisfaction" (Gutiérrez-Maldonado et. al. 523). In a clinical evaluation of the VR therapy technique at the University of Barcelona, researchers used scenarios within the virtual environments (VE) to discover a correlation between the psychological and social factors within body-image disorders. Regarding the impact of food in body distortion, VE's restaurant and kitchen environments present patients with different meal options, existing on various caloric levels to examine levels of body dissatisfaction. Exposure to the food environments revealed that "ED patients showed greater overestimation of their body size when they had to eat high-calorie food (the high-calorie kitchen and high-calorie restaurant situations) than when they had to eat low-calorie food (the low-calorie kitchen and the lowcalorie restaurant)" (Gutiérrez-Maldonado et. al. 525). Another pertinent part of the study was how the presence of people within each environment affected the ED patients body perceptions. VR environments exposed patients to these social pressures by interacting with the avatars in a neutral training room environment to evoke feelings of anxiety and insecurity within the ED patients that would normally lead to their body image distortions. They also added the restaurant scenarios to not only see how their presence influenced the ED patients self esteem, but also the type of food that they chose to eat. Including these social factors into the equation revealed that "neither the people variable nor the interaction between the food and people variables had a significant effect on body-image distortion and body-image dissatisfaction" (Gutiérrez-Maldonado et. al. 526). This method can provide researchers' and psychologists' alike with answers to any preconceived notions they may have built regarding the mental illness.

When it came to assessing body-image disturbances, "The Body Image Assessment Software (BIAS) [which] is a computer program developed to assess body-image disturbances" (Gutiérrez-Maldonado et. al. 523) broke away from the interactive properties offered and focused toward a more psychometric analysis of the body. "The program proposes two visual-assessment tasks: the perceived body-size assessment and the ideal body-size assessment" (523), with this, BIVRS helped to bring the distorted self-image to the ED patients attention showing them the extent of the damage that they have brought upon themselves. Overall results from this study revealed that "patients with ED showed higher levels of bodyimage distortion and body-image dissatisfaction than controls after visiting all of the VEs [Virtual Environments]" (526). This area of the disorder helps to build a connection between the psychologist and their patient's, putting them in them in their shoes and getting a first hand look at the everyday struggles that they face.

The accuracy of the surroundings created by VR has been the key to psychologists' success in breaking down any walls created by their patients, as well as forcing them to evoke and experience any emotions hidden within themselves. This realism has led researchers to make further expansions in using the VR technology for treatment. One such area is in the psychoanalysis of substance use disorders. During this process, various emotions commonly experienced by drug addicts in the real world are triggered in order to determine the extremity of their dependency to the drug. Dr. Patrick S. Bordnick, from the University of Houston, has revealed that the "virtual reality (VR) based cue reactivity has been tested successfully for nicotine, alcohol, and cocaine" (Bordnick et. al. 106). Substances existing on a wider scale of severity have been targeted in other experiments to support

these claims. In one lab study, participants were given "tactile, olfactory, and visual cannabis cues and neutral cues" (Bordnick et. al. 106) that would help scientists determine VR's effectiveness in the addictions field. The head mounted display tool consisted of a "tracking device, and directional audio, vibrotactile, and olfactory stimuli" (Bordnick et. al. 106), that provided participants with a number of social settings ranging from a safe, neutral environment to an extreme setting of temptations pertaining to their addiction "such as bongs, joints, rolling papers, incense burners, black light posters, and cannabis plants" (Bordnick et. al. 109). The olfactory stimuli elicited by the Scent Palette system made each participant feel present in each scenario. Apart from "raw cannabis (buds), [and the] cannabis smoke," other background smells like "pizza, incense-frankincense, beer, popcorn, and outdoor [scents]" (Bordnick et. al.) were also added to "emulate a real world experience" (Bordnick et. al. 106). Interaction with avatars in the party environments abusing drug paraphernalia and pressuring participants immersed in the situation, helped to successfully model the familiar instances pertaining to peer pressure that any addict has faced within the crossroads of their disease. Results from the study revealed that, "current cannabis smokers experienced higher levels of craving and attention to stimuli for VR cannabis cues" (Bordnick et. al. 110).

Being that the patients using VR are suffering from a mental illness, their physical and emotional well being is a top priority during the treatment process. The stimulation produced by the virtual environments has been found to cause a list of side effects including "nausea, headaches, sleepiness, sweating, apathy, dizziness, general fatigue, eye strain, and loss of skin color" (Riva 75). In spite of this, studies have been successful in separating these symptoms from the VR technology. Psychologist Gisueppe Riva has found that "patients exposed to VR environments may have disabilities that increase their susceptibility to [the] side effects" and that during the conducted experiments "instances of simulation sickness were few and nearly all were transient and minor" (75). Considering these potential risk factors, experimenters have added alterations to their studies in order not to overwhelm the patients and maintain authenticity within their research. In Michaliszyn's analysis of the arachnophobia study, he revealed that "each exposure session lasted approximately 1.5 hours with pauses every 20 to 30 minutes to prevent cybersickness" (692). Further research on the VR-induced cybersickness effect have also suggested that the common symptoms "may reflect their generally high levels of affective disturbance or side effects of antipsychotic medication" (Freeman 93). Although the exciting and sometimes traumatic effects brought upon by VR can be physically draining for those exposed, this is more than likely connected to the stress-related emotions clouding one's mental mindset.

VR's unique ability to see through the different capacities of the human unconscious make's it clear that it deserves to be a permanent tool within the psychology profession. Every detail within VR's environments can alter the emotional and mental mindset of those exposed, taking them from a skeptical subject and transforming them into an interactive inhabitant of their surroundings. Endless environmental possibilities existing on a worldwide scale are achieved and carried out in the most cost efficient way, and eliminate any existing nerves that are commonly elicited from patients in real world situations. The former limitations in psychology pertaining to the treatment of mental disorders are now relinquished and a person's inner most thoughts and fears can be brought to the surface, finally giving them a shot at a normal and fulfilling life.

Works Cited

Bordnick, Patrick S., Hilary L. Copp, Amy Traylor, Ken M. Graap, Brian L. Carter, Alicia Walton, and Mirtha Ferrer. "Reactivity to Cannabis Cues in Virtual Reality Environments." *Journal of Pyschoactive Drugs* 41.2 (2009): 105-11. Print.

Gamito, Pedro, Jorge Oliveira, Pedro Rosa, Diogo Morais, Nuno Duarte, Susana Oliveira, and Tomaz Saraiva. "PTSD Elderly War Veterans A Clinical Controlled Pilot Study." *Cyberpsychology, Behavior, and Social Networking* 13.1 (2010): 43-47. Print.

Gutiérrez-Maldonado, José, Marta Ferrer-García, Alejandra Caqueo-Urízar, and Elena Moreno. "Body Image in Eating Disorders: The Influence of Exposure to Virtual-Reality Environments." *Cyberpsychology, Behavior, and Social Networking* 13.5 (2010): 521-28. Print.

Michaliszyn, David, André Marchand, Stéphane Bouchard, Marc-Olivier Martel, and Joannie Poirier-Bisson. "A Randomized, Controlled Clinical Trial of In Virtuo and In Vivo Exposure for Spider Phobia." *Cyberpsychology, Behavior, and Social Networking* 13.6 (2010): 689-94. Print.

Riva, Gisueppe. "Virtual Environments in Clinical Psychology." *Psychotherapy: Theory, Research, Practice, Training* 40.1-2 (2003): 68-76. Print.