Virtual Environments for Clinical Psychologists

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Simulation technology is coming of age and relevant applications are emerging in clinical psychology. A number of technological advances in computer power, engineering, and artificial intelligence have made virtual environments (VEs) attractive for both research and real-world applications in clinical psychology. In addition to the exponential advances in underlying simulation technologies, there has been a growing body of clinical research into the use of simulation technology for virtual reality exposure therapy, virtual environment-based psychological assessment, and training of clinicians using virtual patients.

Virtual Reality Exposure Therapy

Virtual Reality Exposure Therapy (VRET) is a novel tool for systematically exposing clients to specific feared stimuli within a contextually relevant setting. Using VRET, a clinician can immerse a client within a computer-generated simulation or VE that updates in a natural way to the client's head and/or body motion. Typically, VRET researchers follow an emotion-processing model, which holds that fear must be activated through confrontation with threatening stimuli and that new, incompatible information must be added into the emotional network. The amount of research assessing the efficacy of VRET on affective outcomes has increased over the last 10 years as VEs have become less costly, more available, and generally more usable. While much of the research to date has been comprised of uncontrolled designs and open clinical trials, a recent meta-analysis revealed that VRET has good potential as a treatment approach for several specific phobias (i.e. acrophobia, fear of driving, claustrophobia, aviophobia, and arachnophobia; see Parsons and Rizzo, 2008).

Virtual Environments for Psychological Assessment

Virtual environments developed for psychological assessment promise enhanced technology and ecological validity. A growing number of VEs are now being developed and validated that focus on component cognitive processes including: attention processes, spatial abilities, learning and memory, and executive functions. To do this, researchers have developed various VEs such as virtual beaches, caves, fantasy worlds, space stations, and cities filled with skyscrapers, offices, classrooms, homes, and supermarkets. Further, there are a host of aircraft and automobile driving simulations.

Since VEs allow for precise presentation and control of dynamic perceptual stimuli (visual, auditory, olfactory, gustatory, ambulatory, and haptic conditions) that reflect real world environments, they may enhance the ecological validity of assessments through a combination of the veridical control found in laboratory measures and the verisimilitude of the environments that reflect real life situations (Tarr, 2002). Additionally, the enhanced computation power allows for a range of the accurate recording of behavioral responses in a perceptual environmental that systematically presents complex stimuli. Such simulation technology appears to be distinctively suited for the development of ecologically valid environments, in which three-dimensional objects are presented in a consistent and precise manner. As a result, clients are able to manipulate three dimensional objects in a virtual world that proffers a range of potential task demands.

Training of Clinicians using Virtual Patients

Enabling technologies have evolved and now allow for the design of functional and usable "structural" clinical VEs. As a result, researchers have begun "populating" these environments with virtual representations of humans. These virtual human (VH) representations consist of characters that have realistic appearances, can act like humans, and can express themselves both verbally and non-verbally. Additionally, VHs can listen and understand natural language and see or track limited user interactions with speech or vision systems. Advances in simulated VHs afford the possibility of artificially intelligent VHs that control computer generated bodies and can interact with users through speech and gesture in virtual environments. Advanced VHs are able to engage in rich conversations, recognize nonverbal cues, analyze social and emotional factors and synthesize human communication and nonverbal expressions.

Virtual patients (VPs) are virtual interactive agents who are trained to simulate a particular clinical presentation of a patient with a high degree of consistency and realism. Virtual patients can provide valid, reliable, and applicable representations of live patients. VPs have commonly been used to teach bedside competencies of bioethics, basic patient communication and history taking, clinical decision making, and now for training of clinical psychology students (see Parsons et al., 2008). If this exploratory work continues to show promise, clinical psychologists may see a comprehensive DSM diagnostic trainer that has a diverse library of VPs modeled after each diagnostic category. The VPs would be created to represent a wide range of age, gender and ethnic backgrounds and could be interchangeably loaded with the language and emotional models defined by the criteria specified in any of the DSM disorders.

It is important to note that there are ethical and "best practice" challenges that may exist related to the use of simulation technology for virtual reality exposure therapy, virtual environment-based psychological assessment, and training of clinicians using virtual patients. While simulation technology may not be suitable for all aspects of clinical practice, clinical psychologists may benefit from the advantages found in simulation technology: increased standardization of administration; increased accuracy of timing presentation and response latencies; ease of administration and data collection; and reliable and randomized presentation of stimuli for repeat administrations. Further, and perhaps more importantly, simulation technology can better replicate the diverse environment in which persons live.

References

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