Immersed in Anxiety or a Process to Healing? VR meets Mental Health

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Guest "Challenging" Panelist
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Virtual Reality (VR) technology has undergone a transition in the past few years that has taken it out of the realm of "expensive toy" and into that of functional technology. Although media hype may have oversold VR's potential during the early 1990s, computer-based simulation technology is now beginning to emerge as a viable tool for cognitive and behavioral mental health applications.

Virtual reality integrates real-time computer graphics, body tracking devices, visual displays, and other sensory-input devices to immerse a participant in a computer-generated virtual environment (VE) that changes in a natural way with head and body motion. Much like an aircraft simulator serves to test and train piloting ability under a variety of controlled conditions, VEs can be developed to present simulations that can be used to target human behavioral and cognitive processes that are useful for mental health applications. The capacity of VR to create dynamic three-dimensional stimulus environments, within which all behavioral responses can be recorded, offers assessment and intervention options that are not available using traditional methods. In this regard, a growing number of laboratories are developing research programs on the use of VEs for these purposes. As a result, controlled studies reporting encouraging results are now beginning to emerge.

VR applications have shown promise for addressing: fear reduction with phobic clients; pain reduction for burn victims; stress/pain reduction in cancer patients; eating disorders/body image disturbances; spatial navigation training in children with motor impairments; functional skills in persons with developmental disabilities and autism; and assessment and rehabilitation of memory, attention, visuospatial processing, motor skills, and executive cognitive functions in persons with central nervous system dysfunction and the elderly. These therapeutic targets reflect an informed appreciation for the unique assets that are available using virtual technology and provide a foundation of work that is supportive of the further development of VR cognitive behavioral applications. If the associated technology continues to advance in the areas of visual displays, graphics, computing speed/memory storage, 3D audio, wireless tracking, voice recognition, intelligent agents, and VR authoring software, then more powerful and naturalistic VR scenarios will be possible. These advances could result in more readily available desktop-powered VR systems with greater sophistication and responsiveness. This inevitable increase in access will allow for more widespread application of VR technology for clinical assessment and intervention purposes. However, many unanswered questions and issues must be addressed before these types of VR applications can usefully move into mainstream practice.

The panelists have designed and developed VR applications that target a wide spectrum of mental health areas. This group consists of some of the top VR/mental health scientists, who discuss their work using VR to assess and treat persons with phobias, post-traumatic stress disorder, burn and cancer related pain, traumatic brain injury, attention deficit/hyperactivity disorder and learning disabilities, and for specific age-related assessment. The panelists informally present their work in four unified-by-topic groups, less as a "lecture" and more as a discussion among colleagues on a particular topic. Following these presentations, the guest panelist, Mark Wiederhold, assumes a "devils advocate" role and "challenges" the panelists on topics of concern (ethical/legal, accessibility, digital divide, certification for use, side effects, long-term usage, limitations for use, social ramifications) and on what is needed to advance this technology into the 21st century in a rational manner. The remaining time is devoted to lively panel and audience discussion of the key issues involved in development and implementation of VR applications and where we are heading in the future.

Skip Rizzo
Albert "Skip" Rizzo received his PhD in clinical psychology from the State University of New York at Binghamton. He has joint faculty appointments with the University of Southern California Integrated Media Systems Center (IMSC) and the USC School of Gerontology. He is also the director of the IMSC Virtual Environments Lab, which designs, develops, and evaluates the usefulness, feasibility, and efficacy of virtual reality systems targeting assessment and rehabilitation of spatial abilities, attention, and other cognitive functions. Additionally, he is conducting research on 360-degree panoramic video HMD applications for exposure therapy (currently social phobia), computerized facial recognition, and facial avatar animation. He is also designing better human-computer interaction systems for the elderly and persons with disabilities. His other IMSC activities involve provision of human-factors input on IMSC projects in teleimmersion as well as research on integration of immersive audio in virtual environments.

He is the associate editor of the journal CyberPsychology and Behavior and is on the editorial boards of The International Journal of Virtual Reality, Cognitive Technology, and Presence: Teleoperators and Virtual Environments. He is the creator and manager of the Virtual Reality Mental Health Email List server (VRPSYCH). He also chaired the SIGGRAPH 2000 panel on this topic and is an internationally known speaker in this area, presenting at numerous professional events and conferences. Prior to his USC affiliation, he was a cognitive rehabilitation specialist for eight years, developing and implementing cognitive rehabilitation programs for clients with traumatic brain injuries.

Larry F. Hodges
Larry F. Hodges is associate professor in the College of Computing and head of the Virtual Environments Group at Georgia Institute of Technology. He is also co-founder of Virtually Better, Inc., a company that specializes in virtual reality exposure therapy of anxiety disorders in Atlanta. He received his PhD from North Carolina State University in computer engineering (1988), a MS in computer science from NCSU (1984), a MA in religion from Lancaster Theological Seminary (1978), and a BA with a double major in mathematics and physics from Elon College (1974). His research interests are in software and algorithm development, experimental quantification, and application development for virtual reality systems. He is on the editorial boards of the journals Presence: Teleoperators and Virtual Environments and CyberPsychology and Behavior, and is a member of the Steering Committee for the annual IEEE Virtual Reality Conference.

Hunter Hoffman
Hunter Hoffman studied memory at Princeton University and investigated human memory and attention with eyewitness/false-memory expert Elizabeth Loftus. He is a project manager at the University of Washington Human Interface Technology Laboratory and an affiliate faculty of psychology. He studies the use of immersive VR to help reduce pain during wound care in burn patients at Harborview Burn Center. He also conducts controlled laboratory experiments exploring the relationship between the illusion of "presence" in virtual reality and analgesic effectiveness (attempting to maximize analgesic effectiveness). In other projects, he is exploring the use of VR exposure therapy for treating spider phobia, the value of adding tactile cues (position-tracked toy spiders) to increase treatment effectiveness, and using real (mixed reality) chocolate bars to add taste to virtual objects. He has published over 20 peer-reviewed manuscripts, including six in the Journal of Experimental Psychology. He presented at panels on virtual healing at SIGGRAPH 98 and SIGGRAPH 2000, and at the SGI booth at SIGGRAPH 98. He will be giving immersive demos at the MultGen-Paradigm booth at SIGGRAPH 2001.

His research has been covered by CNN, Scientific American Frontiers, the BBC, and the Discovery Channel. He has served as an ad hoc reviewer for JEP:LMC, Psychological Sciences, Presence: Tele-operators and Virtual Environments, SIGGRAPH 99, the Journal of Applied Psychology, and ACM Transactions on Human Computer Interaction. He is also a scientific advisor to VR researchers in Spain and Japan.

Dorothy Strickland
Dorothy Strickland is president of Do2Learn, a computer software company developing virtual reality games for children with autism and related learning disabilities. Her present project, funded by the National Institutes of Health, has designed Web-playable virtual reality games that help children with special needs learn safety and social skills. She is also an adjunct faculty member at North Carolina State University and has presented her research at various conferences including SIGGRAPH 96, SIGGRAPH 98, and SIGGRAPH 2000; the new 2001 game conference Entertainment in the Interactive Age sponsored by the Annenberg Center; and VRAIS, the largest international VR conference, where she has been the keynote speaker. She has published her work in numerous journals, including serving as guest editor for the Communications of the ACM special SIGGRAPH 97 edition on "Virtual Reality and Mental Health." Her research has been reported in several news sources worldwide, including an Associated Press feature and a more recent Discovery Channel special aired in 2001.

Benjamin Watson
Benjamin Watson is assistant professor in computer science at Northwestern University. He earned his doctoral and masters degrees at Georgia Tech's Graphics, Visualization and Usability Center, and his bachelors degree at the University of California, Irvine. His dissertation focused on user-performance effects of dynamic-level-of-detail management. His other research interests include model simplification, visual fidelity, tangible interfaces, information visualization, computer games, and spatial applications of computer graphics. He is on the conference committee for the IEEE VR 2001 conference, and is program co-chair for the Graphics Interface 2001 conference.

Maria Schultheis
My Maria T. Schultheis is a clinical research scientist in the Neuropsychology & Neuroscience Laboratory and an instructor in the Department of Physical Medicine and Rehabilitation at the University of Medicine and Dentistry of New Jersey-New Jersey Medical School. Her clinical and research experience have focused on rehabilitation of cognitively impaired populations, including patients with traumatic brain injury, multiple sclerosis, and stroke. Her expertise is in the area of driving capacity following neurological involvement, focusing on the cognitive demands of driving and the development of new driving assessment protocols. This includes research focusing on application of new technologies such as virtual reality for neuropsychological assessment and treatment. Her research has received funding by such organizations as the National Institutes of Health, the National Multiple Sclerosis Society, and the National Institute for Disability and Rehabilitation Research. She is active in several professional organizations related to neuropsychology and rehabilitation, and currently serves as an editorial consultant to the Journal of Head Trauma Rehabilitation, Rehabilitation Psychology, and the Archives of Physical Medicine & Rehabilitation. She also serves on the Transportation Research Board of the National Research Council.

Brenda K. Wiederhold
Brenda K. Wiederhold serves as director of the Center for Advanced Multimedia Psychotherapy and the Center for Applied Behavioral Services at the California School of Professional Psychology Research and Service Foundation in San Diego. She is a licensed clinical psychologist and has a doctorate in clinical health psychology. She is nationally certified in both biofeedback and neurofeedback by the Biofeedback Certification Institute of America. She serves on the editorial board of CyberPsychology & Behavior and is recognized as a national and international leader in the treatment of anxiety and phobias with virtual reality exposure therapy, having completed over 1,000 VR therapy sessions. CAMP maintains comprehensive programs to treat fear of flying, fear of driving, claustrophobia, panic disorder and agoraphobia, social phobia, fear of heights, fear of public speaking and eating disorders using a combination of cognitive-behavioral techniques, virtual reality exposure therapy, and physiological monitoring. She completed a masters in business administration, has 19 years experience as chief financial officer of an investment firm, and was a former government auditor. She currently is completing her third book and has over 50 publications. She serves as chief executive officer of VRHealth.com, a company that develops virtual environments and conducts clinical research studies using virtual environments and Internet-based worlds.

Mark Wiederhold
My interest in virtual Mark D. Wiederhold is a physician executive with a diverse background in academic health, clinical research, and product development. At Science Applications International Corporation, he invented and patented a non-invasive method for cancer diagnosis that is currently in phase II testing at Tripler Army Medical Center, Honolulu. He also developed a PC-based rugged portable diagnostic medical device for the US Navy and Marine Corps that is currently deployed to the Pacific Fleet. This device was approved by the FDA in four months, and was funded by Congress for two years. He has eight years' experience developing telemedicine systems, including wireless data transmission protocols. He was formerly director of clinical research at the Scripps Clinic in La Jolla, California where he has been a staff physician for the past 15 years. He completed an internship and residency in internal medicine and critical care medicine at the Scripps Clinic. He is on the faculty of the University of California, San Diego Medical School and professor of health psychology at the California School of Professional Psychology in San Diego. He is the editor-in-chief of CyberPsychology & Behavior and editor-in-chief of IEEE Transactions in Experimental Biology and Medicine. He serves on several advisory, editorial, and technical boards. He completed an executive MBA program at the University of California, San Diego, and he is a Certified Physician Executive, a Diplomate of the American College of Physician Executives, and a Fellow of the American College of Physicians. He has over 150 scientific publications.