

No Sweat: Jogging in a Virtual World Using Breath as Avatar Control

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Abstract. Recent research in the fields of Complementary and Alternative Medicine (CAM) and virtual technologies suggest some potentially new and beneficial therapies that may help returning servicemen who present symptoms of psychological stress. CAM therapies are now being validated with evidence-based research. Data from the emerging field of *Self-Perception Theory* shows that use of avatars in virtual worlds can affect a user's psychology and behavior. These findings and discussions with psychologists who use Mindfulness-Based Stress Reduction (a validated CAM therapy), and advice from experts in military social work, has led us to develop a virtual jogging system in the online virtual world of Second Life. Our system is novel in that we use breathing to control the movement of the avatar rather than keyboard controls. There is no spirometer but breath detection is instead done with a microphone by using the seldom-used volume level detection technology available in Second Life that is interpreted through a custom scripting solution.

Keywords. Virtual World, Therapy, Complementary & Alternative Medicine, CAM, stress mitigation, breathing, immersion

Introduction

An extensive 2008 study by the Rand organization, titled *Invisible Wounds of War* (Rand, 2008), reported that at least 300,000 soldiers have symptoms of serious psychological stress, and also that gaps exist in the ongoing efforts to get veterans proper health care for such deployment-related psychological injuries.

The Coming Home project at the University of Southern California's Institute for Creative Technologies (USC ICT) is collaborating with experts in the fields of Complementary and Alternative Medicine (CAM) and veteran support to explore novel ways of extending available health care possibilities for veterans. According to Dr. Jose Coll, Clinical Associate Professor and Chair of Military Social Work and Veteran Services at USC, disabled veterans often express how much they miss jogging and other Physical Training activities they are used to doing every day.

Given recent research in the positive effects of virtual world activity on real life, we believe that recreating such an activity in a virtual world might have a positive benefit on a person's psychological and physical well-being. This is a reasonable assumption based on research by Bailenson and colleagues at the Stanford Virtual Human Interaction Lab on what they term *The Proteus Effect* (Yee & Bailenson 2007; Yee, Bailenson & Ducheneaut, 2009), which indicates that users' observations of their avatars' behaviors can result in psychological effects and a change in their real behavior. In one of the lab's studies, users who observed a virtual representation of

themselves exercising reported significantly higher levels of exercise in the real world after their session than those who watched a representation of someone else exercising or watching themselves not exercising (Fox & Bailenson 2009). Research by Lim and Reeves (2005) at Stanford also shows that the simple act of allowing the user to choose their avatar, and viewing that avatar in a 3rd person perspective, leads to greater physiological arousal and an increased sense of presence in a virtual environment.

1. Method/Tools/Challenges

Based on Dr. Coll's suggestion and our preliminary research, we set about creating a running path for veterans in the virtual world Second Life. We felt it would be most beneficial if a real world activity or input could be transferred to the virtual world as a control mechanism, rather than the conventional method where a player simply hits a key to make an avatar run. Therefore, we made the movement of the avatar dependent upon slow, regular breathing. As long as the user maintains this breathing rhythm, the avatar will run. This concept was based on clinical research that has shown that slow, regular breathing accompanied by biofeedback for as little as ten minutes a day can be effective in lowering blood pressure (Grossman 2001), as well as by the technique of being attentive to one's breathing that is often employed in Mindfulness-Based Stress Reduction, a CAM therapy that is used for stress reduction.

Several challenges were anticipated in the early development cycle. These included virtual world limitations such as seamless region crossing while jogging, lack specific types of avatar movement and user control, and native data collection solutions. Anticipated challenges on the user's end, such as calibrating the microphone for input, and training to use the system, were addressed via an instructional video.

2. Results

Initial usability testing was completed in early January 2010, with veterans who had considerable experience using the Second Life platform, and who accessed the jogging activity via a home-based microphone system. In this testing, none of the participants were able to complete the full length of the jogging path. We determined this was due to several factors: 1) there was some variability in the microphones, 2) calibration instructions were unclear, and 3) code could be improved to enable a greater sensitivity for the breath input. We have completed these revisions and the second round of testing is in progress through the month of January and early February. Results are being analyzed to determine if a third round of adjustments are necessary.

3. Conclusions

After the current development cycle is complete and final revisions implemented, a more extensive round of user testing will be conducted to show the validity of our approach as part of a novel CAM therapy to help reduce stress. We believe that real world controls used within a virtual world setting hold a great deal of promise for veterans and others with specific health needs.