Chapter 7
The Meditation Chamber:
Towards Self-Modulation

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ABSTRACT

The Meditation Chamber is an immersive virtual environment (VE), initially created to enhance and augment the existing methods of training users how to meditate, and by extension, to realize the benefits from meditation practice, including the reduction of stress, anxiety and pain. Its innovative combination of immersive virtual reality (VR) and biofeedback technologies added interoceptive or dimensions of inner senses to the already sensorially rich affordances of VR. Because the Meditation Chamber enabled users to become aware of autonomic senses that they are not normally conscious of, and to manipulate them in real-time, we found that it did enhance users' abilities to learn how to meditate, particularly those who had never meditated. We describe the Meditation Chamber, scientific methods of evaluation and findings, and discuss first-person phenomenological aspects, its long-term applicability for users who have chronic pain, and future directions.

INTRODUCTION

The Meditation Chamber was a project in service of our long-term research interest in the biopsychosocial aspects of chronic pain (Gatchel, 2009). It is a training system and engineering artifact that can be evaluated on engineering terms – questions of effectiveness and efficiency can be answered using scientific methods, as we have outlined. However, it can also be viewed as a tool for exploring ideas of subjectivity as they relate to the physiological states that are inextricably intertwined with subjective experience. Meditation and pain are subjective experiences that take on manifold dimensions that are difficult to communicate or measure (Scarry, 1987). As a means of exploring the subjective aspects of chronic pain, we are embarking on a follow-up project, the Virtual Meditative Walk. It builds upon some of the techniques of the Meditation Chamber to

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enable people who endure chronic pain to be able to better manage it. These two systems form part of a larger agenda to help people express and potentially manage their bio-subjective experiences over time. The knowledge gained in developing and analyzing these two VEs may provide a baseline and framework for understanding VR experiences among diverse knowledge bases. Thus, our approach is a phenomenological one that builds upon the work of Maurice Merleau-Ponty and, more recently, Francisco Varela, Evan Thompson (Varela, Thompson & Rosch, 1992) and others[1]. Because this approach accounts for the interrelations among mind, body and world, it closely parallels the biopsychosocial approach that is at the core of current pain management (Gatchel, 2009). Because felt experience is the subject of this type of phenomenology, it offers a method that necessarily accounts for the subjective aspects of chronic pain, as well as the objective aspects that can be measured scientifically. The research described in the present chapter contributes a new approach to VR-based pain research, because it specifically focuses on the longitudinal aspect of persistent, chronic pain rather than on acute, short-term pain that is addressed by what is termed VR pain distraction. Thus, rather than characterizing the Meditation Chamber and the subsequent research it spawned as "pain distraction," we focus on the way it affords users the ability to manage their attention and awareness so that they may exert agency over their on-going experience of pain. We term this "self-modulation."

THE MEDITATION CHAMBER

The Meditation Chamber was an immersive virtual environment that was originally created by long-time VR researchers Larry Hodges, Diane Gromala, Chris Shaw, and Fleming Seay. It was subsequently refined and used at Virtually Better, a VR clinic that was founded by Hodges, and expanded upon by the Transforming Pain Research Group (Transforming Pain Research Group, 2010), directed by Gromala, a Canada Research Chair. Reported briefly at Enactive 2007 (Shaw, Gromala & Seay, 2007), the goal of the Meditation Chamber was to design, build and test an immersive VE that used biometrically-interactive visuals, audio and tactile cues to create, guide and maintain a user's meditation experience. It is not necessary to use technology to meditate of course. However, the widespread use of CDs, DVDs, and online resources suggests that technology may be a useful way to enhance and reinforce the practices of meditation. More importantly, we discovered that immersive VR, integrated with biofeedback technologies, offer something unique — it enables users to see their intentional efforts to affect their continuously changing autonomic states. While standard biofeedback techniques also offer visual and auditory feedback, the simplistic monotones or waveforms are not immersive or aesthetically engaging. Thus, VR and biofeedback technologies were combined to determine if the immersion and

Figure 1. The Meditation Chamber. Users wear a head-mounted display (HMD) that provides them with stereoscopic imagery and sound. Interaction primarily occurs as users strive to manipulate their physiological states via biofeedback. Biometric sensors are attached to two fingers with Velcro; these sensors tracked galvanic skin response and heart rate. A flexible chest band tracked respiration.