Nevermind: Creating an Entertaining Biofeedback-Enhanced Game Experience to Train Users in Stress Management

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Figure 1. *Screenshots of various scenes within the game.*

1. Introduction

Nevermind is a PC-based biofeedback-enhanced adventure horror game developed in Unity that challenges the player to go outside of his psychological comfort zone. Its use of biofeedback technology isolates the problem of fear and stress, making it a concrete, measurable entity that can be identified and addressed on a very direct and personal level. The high entertainment value of the game serves to compel players to push further to find out "what happens next" - and, in turn, the demand to venture into the terrifying unknown and return unscathed (both as an in-game character and as a person) encourages players to push beyond boundaries of fear in their own lives.

2. Exposition and Biofeedback

In Nevermind, players are placed in the role of a Neuroprober, a scientist who travels inside the sub-consciousness of severe PTSD patients to reconstruct the forgotten memory of the original psychological traumatic event.

The realm of the subconscious is a terrifying place. Players must subject themselves uncomfortable and horrific situations in order to find the lost memories. In order to succeed, the player must stay calm. If the biofeedback sensor detects psychological arousal in the player, the game will become more difficult. When the player calms down, the game returns to its easier, default state.

Nevermind uses an ANT+ Stick and a Garmin Heart Rate strap to detect the player's heart rate during gameplay. The game interprets that data to calculate the player's Heart Rate Variability. to understand if the player is feeling calm or stressed.

Figure 3. *An example of different game states based on the player's psychological arousal levels.*

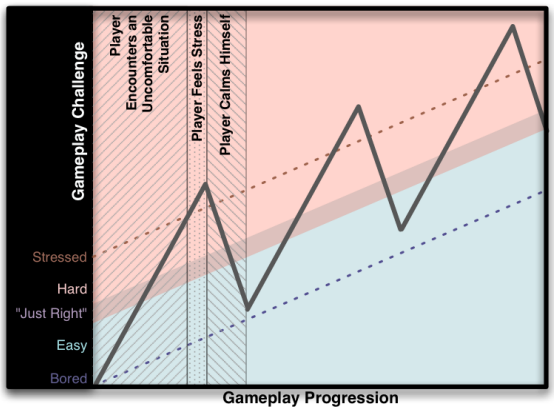

Figure 2. *Gameplay reactive biofeedback challenges players' affective tolerance [Schore 2007] while encouraging them to achieve a "flow state."[Csikszentmihalyi 1990]*

3. Next Steps

Beyond play testing with hundreds of users and informally observing consistent responses to in-game stimuli, we have also conducted a series of more formalized internal testing at USC which yielded encouraging results. We have plans to test in a more rigorous environment via clinical trials in the near future.

References

CSIKSZENTMIHALYI, M. 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper & Row, 1990. Kindle Ebook File. Location 1588.

SHORE, M. AND SCHORE, J. 2007. Right Brain Processes in Psychotherapy: Interactive Affect Regulation as a Central Mechanism of the Change Process. *Right Brain Affect Regulation: An Essential Mechanism Of Development, Trauma, Dissociation, And Psychotherapy.* Yellowbrick. Web. 01 Apr. 2012. <http://www.yellowbrickprogram.com/papers_by_yellowbrick/RightBrainAffectRegulation_p8.html>.

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