Virtual Reality Naturescapes to Reduce Generalized Anxiety

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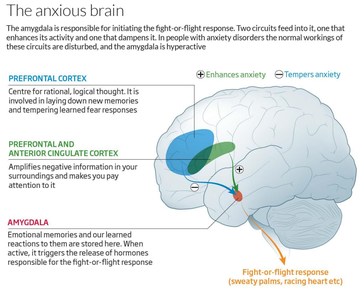
INTRODUCTION

Anxiety is one of the most prevalent mental illness in the world, representing 18% of the population[1,2].

The person with general anxiety disorder (GAD) finds it difficult to control the anxiety and worry, which is often accompanied by restlessness, being easily fatigued, having difficulty concentrating, irritability, muscle tension and disturbed sleep [2].

The amygdala is responsible for the fight-or-flight response. Anxiety disorders disrupt neuro-pathways and create a hyperactive state within this region of the brain [4].



The most common treatments for anxiety range from medication to psychotherapy to other holistic methods. Effective medications include pharmaceuticals such as serotonin-noradrenaline reuptake inhibitors, benzodiazepines, selective serotonin reuptake inhibitors and other antidepressants which change neurotransmitter emission/uptake [5]. Psychotherapy methods include mindfulness therapy, cognitive behavioral exposure therapy (CBT) and psychodynamic therapy among others. A meta-analysis of treatments found that while pharmaceuticals showed strong effect size (ES = 2.02), mindfulness and relaxation showed a 1.56 ES compared to no effect (ES = 1.00) [5].

Recent studies have found the use of Virtual Reality (VR) as potential option for a variety of healthcare-related treatments [7-9]. The ability to create immersive VR experiences as well as allow users to personalize the experience by introducing tunable elements expands the utility of mindfulness and relaxation psychotherapy techniques for generalized anxiety.

The goal of this work is to create an immersive natural environment that combined psychotherapy techniques with holistic approaches to reduce anxiety.

METHOD

System

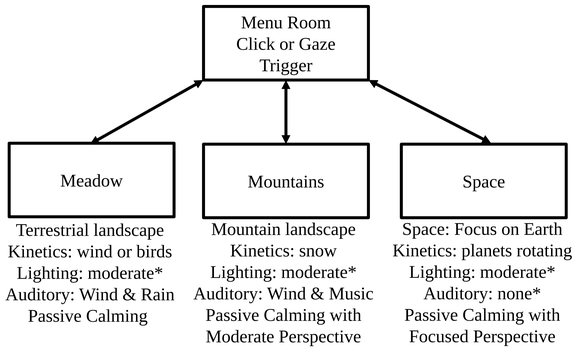
All virtual reality experiences were created with the Unity Real-Time Development Platform (Unity Technologies, San Francisco, CA). These experiences were created with version 2020.1.16f1.

Using the Unity Asset Store, prefabricated baseline assets were imported into each scene (e.g., mountains, trees, wildlife, etc…).

Scenes were further integrated with VFX Graph to create a realistic scene. VFX Graph allowed kinetics to be added to the environment to simulate realism in the environmental scenes such as snowing and raining.

Interaction and function were then scripted using C# within Microsoft Visual Studios (Microsoft, Redmond, WA). Scripting objects within the experience created a more immersive and interactive environmental area.

Design Layout



* Can be variable in later prototypes for customization

Phase 1: Develop baseline environments with key kinetic elements (VFX Graph and Scripting)

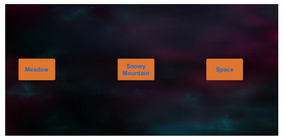
Phase 2: Add Gaze-Only interaction for use on mobile platforms (iOS and Android)

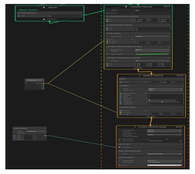
Phase 3: Add customizable lighting/auditory/interaction options to improve individual user experience.

RESULTS

Menu

A start menu is created for the user to begin or quit using the VR headset. The user will hover over the "start" button which will then take them to another menu which they can choose which of the three scenes they would like to enter.



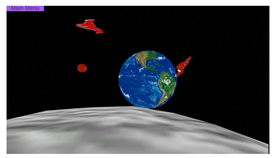


Meadow/Mountain Scene

Scenes including a meadow and mountain were created. Studies posted from the Journal of Environmental Psychology mentions the occurrence of biophilia, human beings' natural desire to interact with their natural environment. Researchers found that staring at a scene of nature for 40 seconds can cause the brain to enter a more relaxed state [10].

Space Scene

While fundamentally different than the naturescapes above, this space scene allows for users to contemplate perspective. Intentionally positioned, the user is standing from a satellite (moon) while looking toward Earth; this could encourage the user to view daily problems that contribute to anxiety with much less significance.



Each experience has kinetic components for the user's focus: the bird (meadow), snow(mountains), and planetary revolution and rocket (space). These slow-moving objects allow a focal point for modest distraction to enhance the calming effect.

CONCLUSION & FUTURE DIRECTIONS

Three individual VR naturescape scenes have been created. Kinetic elements have been added to each experience to create a more realistic experience.

Future directions involve adding more detail and environmental concepts into each scene to deepen the connection between the scene and the user (Phase 1).

Next, create accessibility for clicking/switching between scenes.

Finally, scripting Gaze-Only interaction for Phase 2 (mobile devices) as well as adding lighting/auditory customization will be implemented in future versions (Phase 3).

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