Anxiety Disorder Detection and EMDR Treatment Using Optical PCCR Eye Tracking

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Anxiety disorders are an extremely common occurrence within many demographics. They become a major hindrance to daily activity when not treated in a timely manner and have the possibility of progressing into a panic attack. There are no solutions in place currently that track anxiety event symptoms to administer this aid. The goal of our project was to develop a system that would track anxiety symptoms and reduce symptoms before the onset of a panic attack or reduce the hindrance of the symptoms. In this project we designed a portable head mounted apparatus that utilizes pupil center corneal reflection (PCCR) eye tracking to deduce a patients modes of bias. We measured for vigilance bias, maintenance bias and eye movement patterns to determine the anxiousness of a patient and the object of their stress using spacial object detection machine learning. Using control data collected from ourselves we determined the normal eye tracking indicator values for different anxiety triggers to calibrate the headset and find the ranges of tracking values that determine an anxiety event. Using this data we are able to determine if a patient requires aid and administer this aid in the form of a automatic assisted eye movement desensitization and reprocessing (EMDR) psychotherapy process. We tested the accuracy of our eye tracking using dot calibration tests and the precision using different lighting conditions and head positions. The object classifier was tested using accuracy and confusion matrix methods. We tested our own object phobias to determine the accuracy of our system.

Awards Won:
American Psychological Association: Certificate of Honorable Mention