CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Edward A. Trimble

Project Number

S0421

Project Title

Using EEG as an Evaluative Tool for Sustained Concentration Studies: Phase III

Abstract

Objectives/Goals

I did this project to see if left-brain and right-brain hemispheric activity could be recorded on an EEG to indicate sustained concentration and good mental discipline or imagery, and transition to physical execution of a move during a game such as chess, as an indicator of the subject being able to sustain concentration over long period of time.

Methods/Materials

My hypothesis was that an EEG would be able to indicate this by displaying long period of beta wave concentration. Two subjects, one an experienced chess player and the other a novice, were #wired# to an EEG and instructed to be at their maximum concentration while trying to defeat a chess program. An EEG technician was instructed to start the EEG 8-9 moves into the game. The results were then to be compared.

Results

Changes between EEG waves were very abrupt in some circumstances. The experienced chess player went right into a sustained beta wave level of concentration, indicating that he/she was #in the zone#. Physical movement appeared on the EEG as spikes marking where the player had to make a move against the computer. The beta wave concentration returned immediately after the movement. The novice player, however, started with an alpha wave concentration which indicated he was very relaxed but not as focused. Beta wave concentration was much shorter and interrupted by movement and alpha waves. The player#s EKG also become elevated when making a move but became calmer when the subject started tapping a pencil.

Conclusions/Discussion

I concluded that an EEG could be used to record sustained concentration indicated by beta waves over longer periods of time, and conversely to indicate when a subject is not concentrating adequately, indicated by alpha waves. This would suggest that it may be a diagnostic tool to assist athletes, artists, surgeons, and musicians employing a mental imagery program and a high level of physical performance.

Summary Statement

This project examines the use of an EEG to identify whether a subject is displaying sustained concentration or not as an evaluative tool.

Help Received

My advisor Dr. Morse helped provide an EEG with technician and school facilities. All other work was mine.