Can Playing Web Games Help Sharpen Our Brain?

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Introduction

- Working memory (WM) is defined as a system that is needed to keep things in mind when performing complex task such as reasoning or learning. It was once believed that the capacity of WM is constant through life span, but psychophysiological evidence has emerged suggesting that it can be improved by adaptive and extended training as reflected in a better task performance.

- Neuroimaging studies have further shown that there are greater activities after WM training in the prefrontal and parietal cortex and these higher activities are associated with the facilitator effect on striatal dopamine release.

- However, to our knowledge, there have been no neuroelectro-magnetic studies that address the issue about WM training There is only event-related potential (ERP) studies which use the n-back task to access the WM capacity in association with memory load. P300 peak amplitude decreased with in-creasing memory load, reflecting reallocation of attention and processing capacity away from the matching sub-task to working memory activity.

Method

- We use Electroencephalography (EEG) to detect the brain waves. EEG also can test that provides electrophysiological evidence of how the brain functions over time, determine the brain death, and to use on people who are having problems associated with brain functions: confusion, coma, tumors, long-term difficulties with thinking or memory, or stroke.

- We use N-back task on our participators. N-Back task is a one of the working memory assessment.
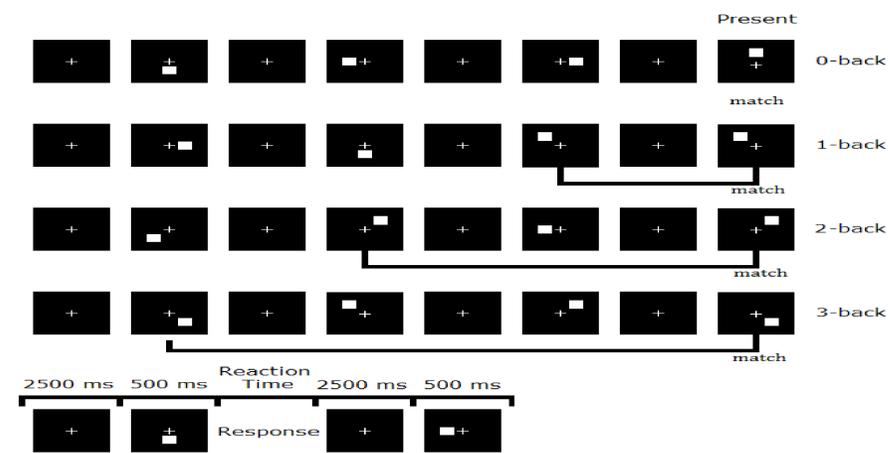

Figure 1. The illustration of the spatial n-back task and the n-back task timeline.

- The participators must know the rules before starting the experiment. They try their best to get the right square position as a square shows. Above shows 0-back on the top that has only one square that is the right answer, 1-back must match the position of square with the one next to it, 2-back must match the position of the square two images away, and 3-back must match the position of the square three images away.

- Most importantly, they have to try their best not to blink their eyes. Because it might cause Electrooculogram (EOG), which we don't want in our recording.

- The final step, we have to reduce the EOG as much as we can for our recording data

Figure 2. : Putting the Electrode Gel to EOG cap to reduce impedance.
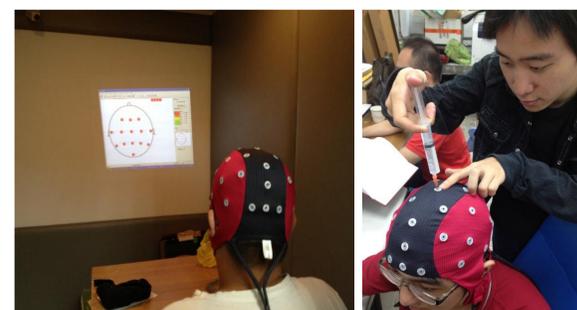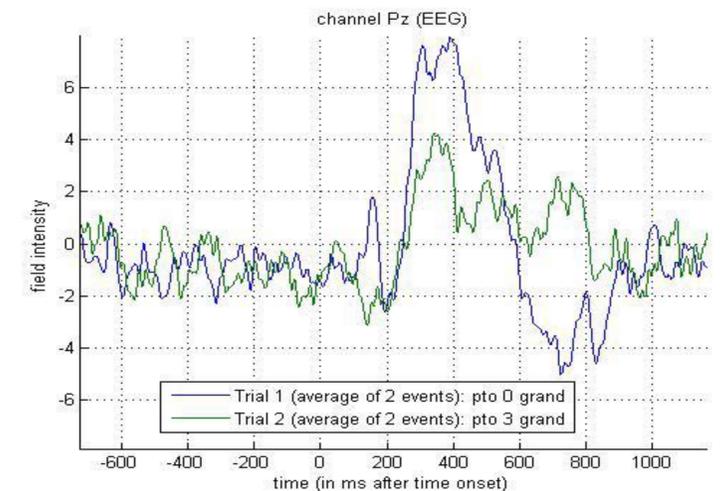
Results

Figure 3. It shows clearly the P300 is decreasing when we increase the memory load.

Experience

- Doing this project, we learned how to use a EOG cap, EOG gel, MATLAB software to collect the data. We also learned how to remove the EOG.

- During the course of the experiments, we had to address collecting the P300 peak. In order to have a meaningful outcome, we had to remove the EOG or reduce it as much as possible. We encountered many obstacles to get the P300 peak, in the end we finally succeeded.

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