

**The Mind Body Room**  
A program for resilience and optimal performance  
Integrating the most advanced scientific and behavioral technologies for  
optimal mind and body functioning  
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## **Focus@Will music effects on brain electrical activity and brain function**

### **White Paper**

This research project was designed to test the effects of using music created by Focus@Will on attention and on brainwave, or electroencephalographic activity during a 70 minute reading experience.

#### **Methodology:**

Subjects: Subjects were recruited through an advertisement on Craig's list, offering to pay \$25 for participation in the one and one half hour study. Subjects were between the ages of 18 and 50, with the requirement that English be their native language, no neurological or psychiatric conditions and no chemical addictions.

Reading music: two types of background music were employed during the study: music preferred and selected by each subject, or music designed by Focus@Will. The latter music was designed specifically to improve focus and concentration during reading or other types of work performance.

Reading materials: subjects had a choice of three different biographies to read from: Barack Obama, Stephen Jobs, or Oprah Winfrey.

Procedures: Subjects completed a brief, one page questionnaire about their work, study and reading habits. Subjects were then connected to a Thought Technology Infiti biofeedback system via surface recording electrodes. Two active electrodes were placed bilaterally over P3 and P4, based on the International 10-20 system, to detect and record electroencephalographic (EEG) activity under the surface of the electrodes. These placements were chosen as relevant to reading and other performance variables. Once connected, each subject experienced the following procedures:

Two minutes pre-baseline recording, while sitting quietly in the chair without any music or reading;

Two minutes in which music – either experimental or control – was added. One half of the subjects were randomly assigned to listen to the experimental music during this first part of the

session, while the other half of the subjects listened to the control music. Music selection was reversed during the second part of the session.

Thirty minutes in which the subjects read from one of the biographies, while the same music was being played.

Two-minute baseline, with subjects sitting with no reading or music;

Two-minute baseline, in which music was added (music selection during this portion of the study was reversed from the original selection)

30 min. in which the subject read from the biography, while the same music was played;

Two-minute post session baseline: no music or reading.

Total time of research session was 70 min.

#### Results:

Figure 1 presents the mean spectral magnitudes for each EEG frequency band during the first and last five minute reading periods for experimental and control music conditions. When the means for the two conditions during the last five minutes of the reading periods were compared, we found an increase of 11%-12% in the theta and beta frequency bands in the experimental condition compared with the control. The difference at the P3 site was significant at the 0.03 level for theta, and at the 0.04 level for beta frequencies. At the P4 site, the theta and beta frequency differences were significant at the 0.05 level.

Other frequency bands also showed an increase in spectral magnitude in response to the experimental music, but did not reach statistical reliability. Similar comparisons of the two conditions during the first five minutes of reading also did not show significant differences.

#### Discussion:

Location of the active electrodes at P3 and P4 was determined based on the functions served by these areas. They are situated over brain area 39, which bilaterally serves functions such as processing language, reading, spatial focusing and executive control. On the left hemisphere site P3, there is involvement in reading and symbol manipulation, while on the right hemisphere P4 is involved in focused audio attention, perspective taking, visuospatial and other functions.

The increased mean spectral magnitude, found in the theta and beta brain wave frequency bands when compared with control music presentation indicates greater organized firing of nerve cells. In other words, there is increased neural synchronization associated with the experimental music. This is suggestive of greater focus which occurs when there is such a mobilization of a population of nerve cells for a specific task.

It should be remembered that the control music was chosen by each subject. It is likely that their music selection could be having a positive effect of its own in activating the brain. Thus, the experimental music, in achieving significantly higher levels of activation is even more impressive. The fact that no significant differences were found during the first five minutes of reading may be a reflection of situation novelty which was true for both conditions. This novelty might be expected to wear off by the last five minute period.

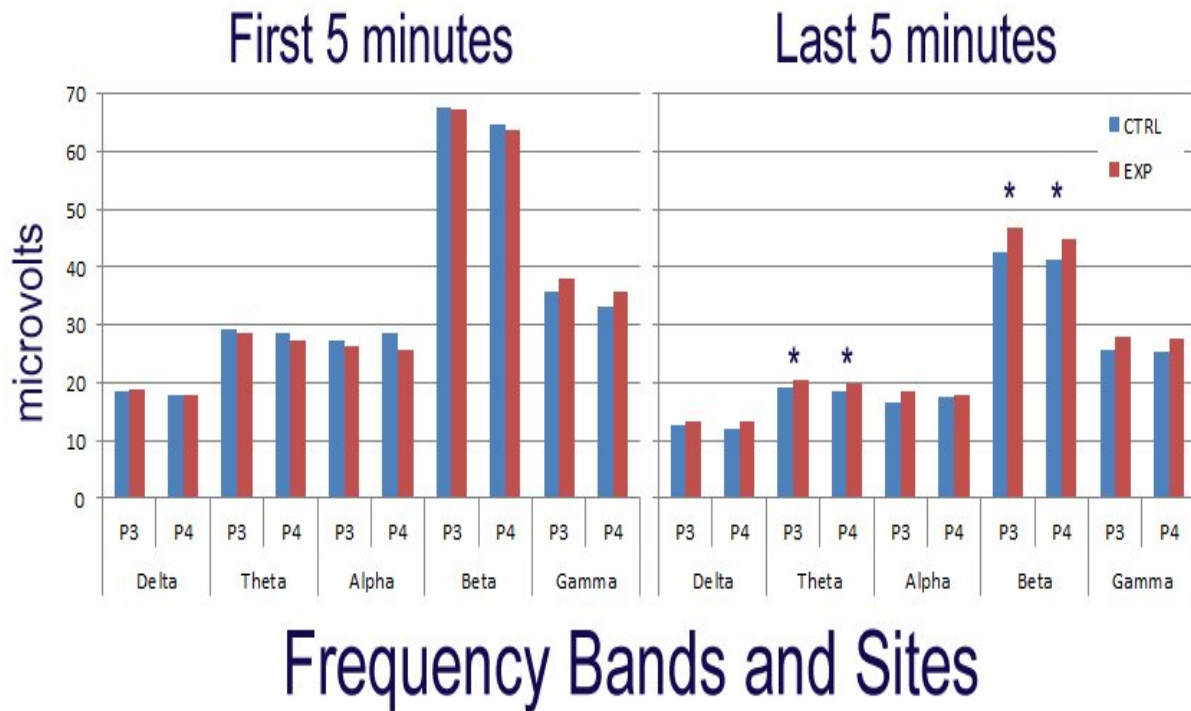


Figure 1: Mean spectral magnitudes for P3 and P4 during control and experimental music conditions for all frequency bands during the first and last five minute reading periods. Significant differences found between control and experimental music conditions during the last five minutes for theta and beta frequency bands.