

Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Investigation)

(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number: JBBC109

Project Title: Which type of music improves your concentration more while studying?

Project Type: Investigation

*To our best knowledge, there are / are no * similar works in the field; (if there are,) related research links are as below:*

**Please delete if not applicable. The competition values the originality of works. Students must do enough literature research to ensure that their works are unique and list relevant reference materials before starting research or invention.*

I. Background

With the copious amounts of pressure students nowadays are facing in school, there is not much time for them to study for the upcoming tests and at the same time, trying to balance their own social life. Students have many ways to deal with this problem, most use music as a form to relax and comfort them while studying or doing homework. Finding the perfect song to maximize concentration for students can not only help the study more effectively, but it might also spark a new interest.

II. Objectives

We hope to find out which type of music improves our concentration more while studying so students can study more effectively, easing off some pressure from the unending time limits by finding the perfect song to maximize concentration for students and help them study more effectively.

III. Hypothesis

While studying, the concentration from it affects both gamma frequency and delta frequency. According to an article from ScienceDirect and ScientificAmerican, gamma waves are the fastest brain activity with the highest frequency. It is responsible for cognitive functioning, learning, memory, and information processing. On the other hand, delta waves are the slowest recorded brain waves in human beings, of which the brain waves have the greatest amplitude and slowest frequency. They are associated with the deepest levels of relaxation and restorative, healing sleep. Therefore, we mainly recorded the gamma and delta waves through an electroencephalogram (also known as EEG), a device that helps us monitor brain wave activities.

IV. Methodology

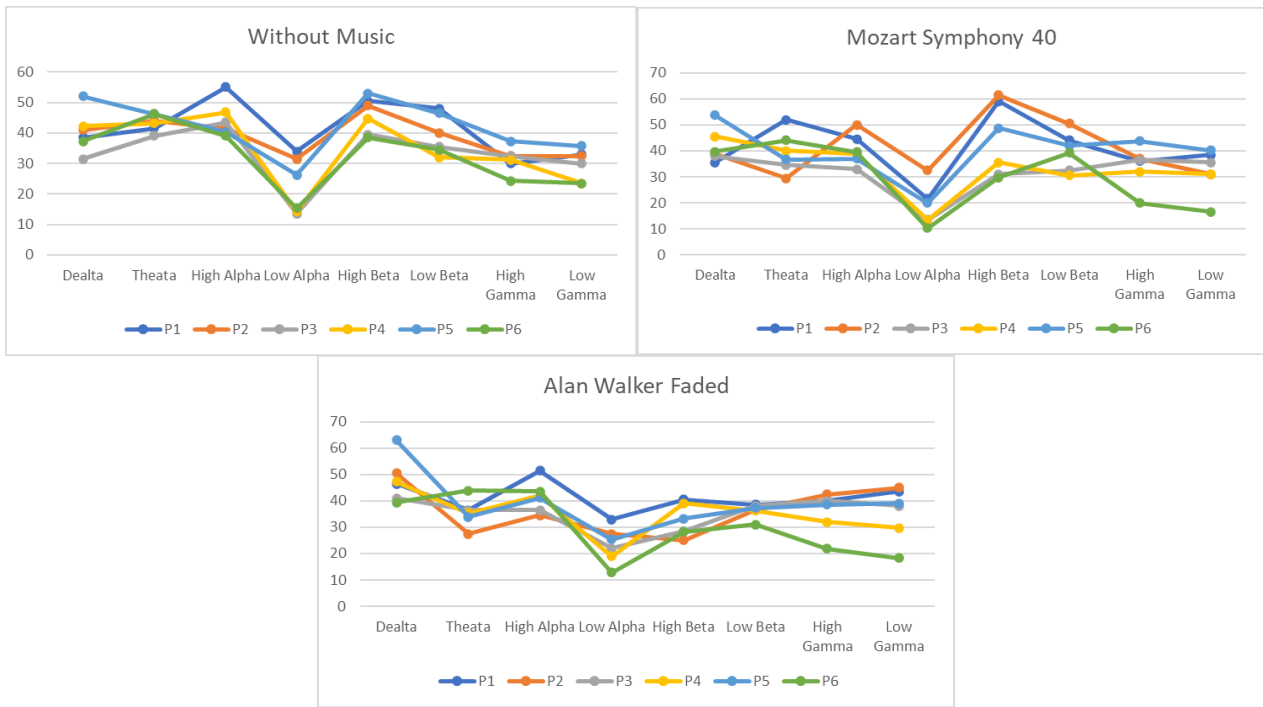
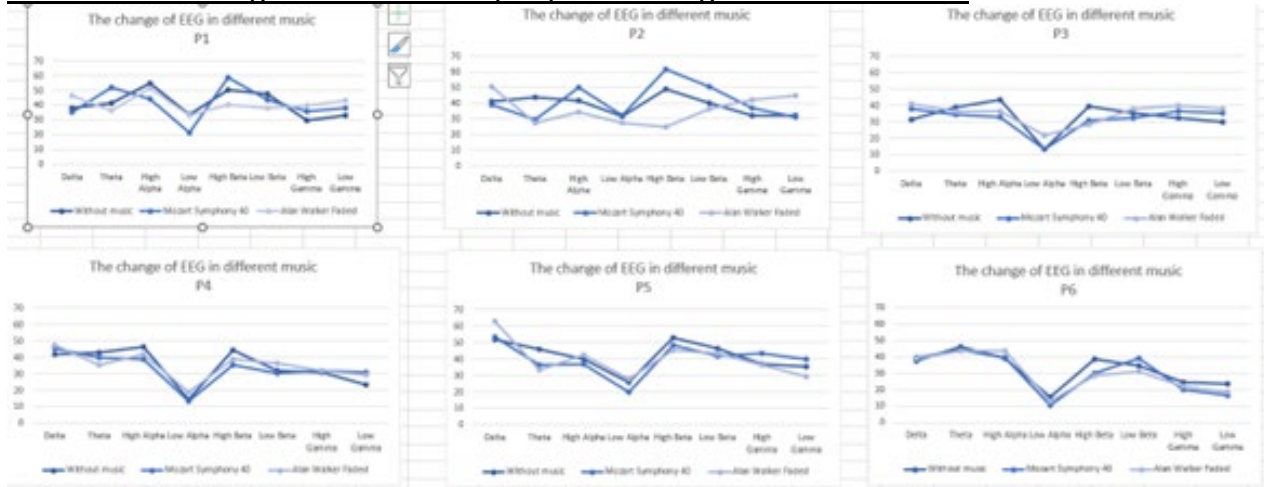
Materials: EEG, computer

Procedure:

1. Randomly generate a passcode-like passage
2. Memorize as much as you can within twelve minutes
3. The first four minutes will be pure silence for a controlled experiment
4. The next four minutes will play classical music
5. The final four minutes will play modern music.
6. Screenshot the Excellent Brain Visualizer page every minute
7. Insert the results into a graph
8. Compare which genre of music has the higher gamma rate and lower delta rate.

V. Results

The brainwave signals of different people listening to different music



Comparing the graphs above, we found that low alpha has the lowest frequency among all the waves. According to studies, alpha brain waves (8Hz -13Hz) are between delta and gamma waves. These waves are produced when we are feeling relaxed in an awakened state, for instance, waking up and warming up muscles. This means that the participants are concentrating on memorizing.

In addition, beta waves are the highest when listening to classical music or silence, compared to the other graphs. Mentioned above, beta brain waves are associated with conscious thought and logical thinking. Therefore, our brains become more active when listening to classical music and are more focused.

Next, delta waves are the highest when listening to modern music. Also mentioned above, delta waves are produced most when sleeping, as a result, the participants feel most relaxed when modern music is played.

Lastly, there is no huge difference in gamma waves produced between classical music and modern music, but overall the frequencies are higher than that of silence. As a result, listening to music is more effective than silence when studying.

VI. Conclusion

To this end, the gamma wave increases significantly when listening to music whilst studying. Thus, listening to music triggers the brain to think more. Comparing classical music and modern music, the beta wave is higher in the former than that of latter, meaning that we are more focused when listening to classical music; on the other hand, the delta wave is higher in latter than that of former, showing that modern music makes us feel more relaxed.

All in all, classical music is more effective than modern music. Yet, there is no huge difference between these two since the gamma waves are similar.

□ Our project is developed based on previous project and the enhancement is below: