

What is the effect of various activities on wave patterns of the brain?

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Overview

We are seeing the effects of a range of different activities on our brainwave patterns. Some activities involve concentrating mentally for a timed period (e.g. gaming and reading), some are “physical” (e.g. painting, drawing). We worked in pairs, wearing headsets to measure brain wave patterns on laptops, using Bluetooth technology. We used state of the art MyndPlay Pro Software for analysis, and learned how neuroscientists justify conclusions with data that has been obtained from experiments done fairly. When data has been evaluated, we hope to present findings to academics at various venues, such as University College London.



Figure 1 Analysis Screenshot

Aims

For 15 students to:

- work with a real brain scientist.
- see the effects of a range of different activities (physical and mental) on our brainwave patterns, using cutting edge technology: EEG (electroencephalogram) Brain sets and MyndPlay Pro Software.
- scientifically plan the study with a hypothesis & method.
- Analyse data collected to produce graphs. Interpret the data to produce a conclusion.
- collaborate with one another, to carry out the activities in controlled conditions.
- evaluate our method to see if we can spot limitations, and so manage them for further work.
- ultimately produce a poster and talk through communication and teamwork skills

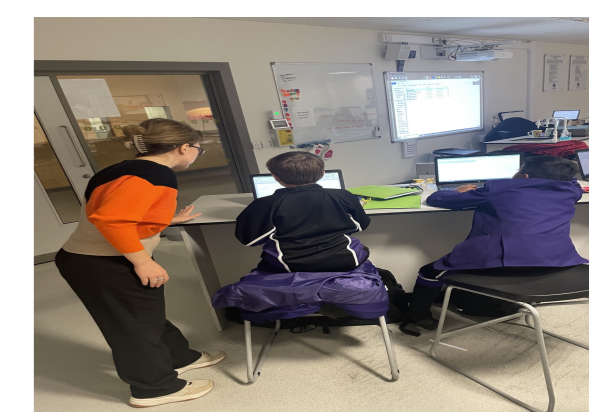


Figure 2 Students designing results table with Dr. Benilova

Background information

Brainwaves looked at were: alpha, beta and gamma waves, which are active when we are conscious.

Alpha waves are active when we are calm, relaxed and being creative, beta waves are active when we are alert and concentrating, and lastly gamma waves which are active when you are undergoing highly perceptive tasks, such as concentrating on problem solving, such as processing maths problems.

As a group we tried to include a variety of “physical” and “mental” activities and designed our experiments to make them fair.

Methodology

Working in pairs, we wore portable EEG headsets, connected by Bluetooth to laptops, recorded brainwave patterns at rest, and during different activities (over 8 weeks), for a set length of time of 3 minutes. The activities have been subdivided into “mental” tasks (maths problems, reading, bouncing a table tennis ball on a bat and video gaming), and “physical” tasks (walking on the spot, origami, drawing and writing). Raw data was sent by Bluetooth to the laptop in real time and recorded. This raw data was then uploaded into CSV files, stored and analysed. We collated data from one another, analysed it, using the Myndplay Pro software, and drew conclusions from this data.

Predicted results

So far we have been collecting the raw data on a weekly basis and have not yet analysed this data in full, as it takes a long time to gather the raw data in the first instance, because of the extra time pairing the 15 Myndbands with 15 computers. Please look at figure 1, to see a picture of the type of data we have recorded so far.

What we predict is that physical tasks will elicit mainly beta waves, as this wave equates to activity, and mental tasks will mainly elicit alpha waves, as these waves equate to relaxation. Gamma waves may be the majority type of wave in certain high perception tasks such as problem solving in Maths.

Conclusion

We have not fully analysed the data as yet, so cannot give our conclusion.

Next steps

Our next steps will be to analyse all the collected raw data using the Myndplayer Pro Software, and draw conclusions. We have been fully trained to carry out the collection and analysis of data.



Figure 3 Students collecting brainwave data whilst reading