Science Fair (2023-2024) Project Summary

How Does Music Affect the Brain?

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## Introduction

Everyone loves music and it is a part of our daily lives. We both dance, sing, play the piano, and love listening to different genres of music. This made us wonder how music affects us, especially how it changes our feelings. Since feelings are primarily related to the brain, we would like to find out how music and the brain are connected.

In this project, we covered four main questions:

* How does music make people feel?
* Do different genres of music evoke different emotions?
* Which parts of the brain are triggered to different types of music?
* How music is transmitted from the ears to the auditory cortex and to the other parts of the brain?

## Background Research

How does our brain understand music? Well, it's kind of like solving a puzzle. When we hear music, the sound travels through our ears and up to the brain. The first stop is the auditory cortex, which is like the brain's music studio. It's where the brain starts to figure out all the different sounds, like high notes and low notes.

Our brain has special parts that work together to understand music. It's like having a team, where each member is good at something different, like rhythm or melody. This team works on both sides of our brain, which is pretty cool. As the music moves through our brain, it goes to more complicated areas. Think of it like a video game, where each level gets harder. Our brain figures out more complex stuff about the music at each level.

But it's not just about the notes and tunes. Our brain connects music to our feelings and memories. That's why sometimes a song can make you really happy or a little sad. This happens because of the limbic system, a part of our brain that deals with emotions.

Understanding music is also about asking 'why.' Why do we love music? Why does our brain spend so much effort on it? Music doesn't seem to be about surviving, like finding food or staying safe. But still, our brain thinks music is really important. Maybe finding out why we love music can teach us more about our brain and music itself."

We know that usually people listen to music when they are stressed or angry and get over what they are feeling. We feel relaxed or less sad when we listen to certain types of music. However, certain genres and styles are not meant to sound joyful. For example, many pieces of music in a minor key may not be happy. Another example is that songs by composers like Chopin, Beethoven, and Mozart may be used to convey feelings of mystery, nostalgia, or even frustration.

## Hypothesis

We believed that most people's favourite music genre would be either classical or pop. We hypothesized this because of the following reasons.

Classical music has been around for hundreds of years and is well known for its famous composers, unique style, and different eras, like Renaissance, Baroque, and Romantic, just to name a few. Most of the famous composers we know, like Bach, Mozart, and Beethoven composed classical music and left behind a great legacy.

On the other hand, pop music, also known as pop, is fairly new, but has taken the world by storm and became very popular (hence the name) in just a few decades. Many famous artists like Micheal Jackson, Taylor Swift, Justin Bieber, and Beyonce usually sing in the pop genre and have many listeners. Additionally, many radios play lots of pop music, so we decided pop was a good hypothesis.

We think the temporal lobe and frontal lobe of the brain are the most affected by music, and since most people want to be happy, they will listen to happy music. Pop and classical songs are generally happy, so we predicted that pop and classical music would have the best results in our survey.

## Variables

We made a survey to understand how people feel when listening to their favourite and least favorite genre of music. In this survey, we chose the following variables to address the first two questions of our research.

### Manipulated Variables

Our manipulated variables include the age of the survey participants and the options for their most and least favorite music genres. The age of participants in the survey ranged from 10 to 60 years old, including elementary school students, mid-high school students, working professionals, and retired people. The options for different music genres are pop, country, classical, rock, instrumental and electronic or techno.

### Controlled Variables

Our controlled variables are the survey questions. They are the same for all survey participants. Hence we were able to assess the responses in the same way for all different age groups of people.

### Responding Variables

Our responding variables are the answers of the survey participants. Particularly, their feelings, and their reasons for likes and dislikes related to music.

## Materials

* Google Forms for survey
* Binder for Logbook
* Google Docs for logbook and research
* Google slides for presentation

## Observations

We have observed that many 10-12 year olds love pop and country music and listen to it more often. Usually this is because it is jumpy and has a nice tune. Pop music often has a feel good factor and lights up different parts of the brain. We also recently figured out that music most affects the temporal lobe of your brain and in the temporal lobe, it is mostly the auditory cortex.

## Conclusions

In conclusion, we wanted to find out how music affects the brain because we both love listening to music and know many songs and wanted to explore more about how music and the brain are related. Based on our research, we guessed that the temporal and the frontal lobe will be the most affected by music. The reason we thought about these parts of the brain is because we thought most people want to listen to music and be happy. Our experiment/ google form showed that many people love listening to pop music because it is happy, and exciting. Although, according to our graphs, almost everyone hates rock and heavy metal music. Reasons that they give include “It’s too loud and noisy” and “It makes an annoying pounding sound in my head.”. Our hypothesis was therefore incorrect because insead of the temporal and frontal lobe being the most affected by music, the auditory cortex is. We were also incorrect about classical music being famous and people's favorite type of music. Although, we were correct about pop music being the most famous due to its fun and jumpy rhythm. I believe this is because we thought that the frontal lobe is very dominant against the other lobes and it is the biggest.

## Applications

We could apply our research to many aspects of real life, like therapy, anti-stress tools, psychology, and focus tools.

* + For example, maybe a certain type of music or even a soundwave of some sort could be used to heighten attention span or energy levels.
	+ Some articles talk about how music can help the elderly and newborn/infant population’s wellbeing.

Another thing is that maybe many music artists will aspire towards pop and country music in the future, since our survey seems to be showing a big trend towards the pop and country genres.

* + Additionally, many famous singers and songwriters like Taylor Swift have gone down that path, so it seems likely that at least a portion of people will decide to try that too.
	+ Find out more about how our brain figures out music.

## Improvements

Our experiment could have been improved by clarifying our scientific question earlier on. We had a lot of confusion in the earlier weeks, and it took us a while to get on track.