

GAMING UX-



THE EFFECT OF BACKGROUND MUSIC ON THE PLAYERS WITH AND WITHOUT MUSICAL EXPERTISE IN RACING GAME



Abstract

This study comprehensively explores the interplay between musical background, gaming performance, physiological responses, and subjective experiences. By employing diverse methodologies like pre-screening surveys, time performance analysis, heart rate (ECG) measurements, EEG recordings, and exit surveys, the study uncovers multifaceted insights.

Introduction & Background

In our daily lives, music is undeniable and has an unanticipated effect on our bodies and minds. Music may evoke specific emotions when we are completing tasks, working out, or playing video games. For instance, in the RPG (role play game), music is a crucial component to keep listeners relaxed and immersed for the duration of any activity. Yet the academic world has rarely studied how game music compares between different players.

The purpose of this study is to examine how background music affects musicians and non-musicians during gameplay, and assess whether it enhances performance or distracts them. Literature review, primary research involving surveys and experimental measurements during gameplay, and data analysis make up the three main parts of the study.

The goal of this study is to provide valuable insights into the impact of background music on gamers' performance and experiences. The findings will contribute to the gaming community and inform game developers and researchers.

Research Question

1. Considering the same condition with different background music quality, what effect and difference will occur in a player with and without musical expertise?
2. As the previous study has the result that the players have the best performance without any background music in a racing game, does it also apply to players with musical expertise?

H0: In this study, There is no significant game play performance difference between players with and without musical expertise.

H1: In this study, it is hypothesised that participants with musical expertise will perform better than those without musical expertise in games that contain background music.

H2: In this study, based on the previous studies result, it is hypothesised that participants with musical expertise and those without musical expertise performed the best under the silence condition.

Study Methodology

1. Desk Research

Desk research illuminates the intricate interplay between musical background and cognition. The preliminary desk research was vital to investigate music's influence on emotions, physiology, and contrasting musician and non-musician responses. It also defined study standards, including musician criteria, music selection, game choice and methodology application in the data collection phrase.

2. Study Design

This study employed a comprehensive research design to explore the intricate interplay between musical background and various cognitive and physiological aspects during gaming.

Participants from both musician and non-musician groups were involved in a series of tasks, including **pre-screening surveys to assess perceptions, EEG recordings to capture neural responses, heart rate measurements to gauge physiological reactions, time performance analyses to assess gaming proficiency, and exiting surveys to gather subjective experiences.**

Technical Check Pilot Test Analysis Planning

3. Data Collection & Analysis

Time Performance:

- Time data will be analysed to understand how participants from different musical backgrounds perform in the racing game.

Physiological Responses (ECG & Heart Rate):

- The impact of music quality on heart rate will be explored, along with any variations between musician and non-musician groups.

Neural Activities (EEG):

- Group comparisons will be made to understand how musical background influences neural responses during gameplay.

Subjective Experiences (Exiting Survey):

- Exiting survey data will be examined to uncover participants' perceptions and preferences regarding background music.

Process



Pre-Screening Questionnaire

The pre-screening survey is a preliminary assessment conducted before the main study to **gather relevant information from participants**. This survey helps ensure that the selected participants fit the criteria necessary for the study's goals, enhancing the validity and relevance of subsequent analyses. **Total 12 of participants(6 musicians and 6 non-musician) selected for the next phase**



Gaming Experimental Study

The gaming experimental study involves participants from both musician and non-musician backgrounds engaging in a controlled gaming environment. The study employs a popular racing game, Mario Kart 8 on the Nintendo Switch, as the gaming platform. Participants are tasked with completing a series of gameplay rounds while various data are collected. This includes physiological measurements such as **heart rate (ECG), cognitive responses through EEG recordings, and time performance metrics.**



Exiting Survey

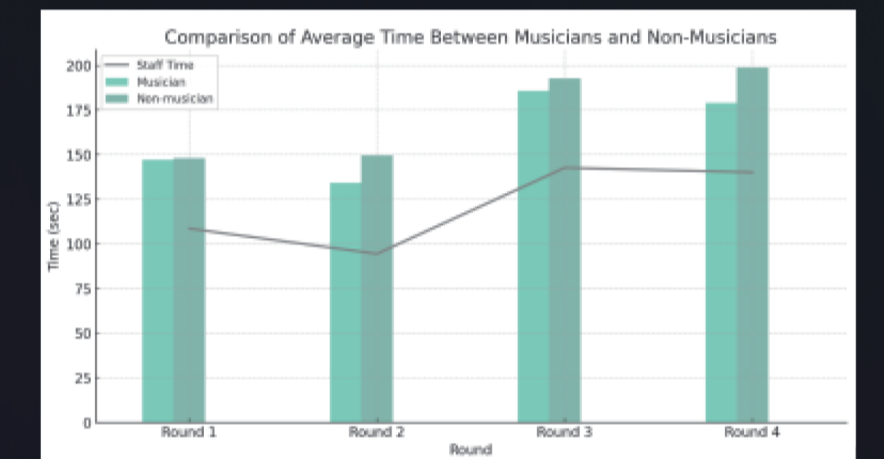
The exiting survey survey gather participants' **subjective experiences, perceptions, and reflections** on their gameplay session. Participants are asked about their preferences for gaming conditions (with or without background music), the impact of music on their gameplay, and their overall emotional and cognitive responses. The survey provides valuable insights into how participants perceived the presence or absence of background music, its impact on their performance, mood, and overall gaming experience.



Result

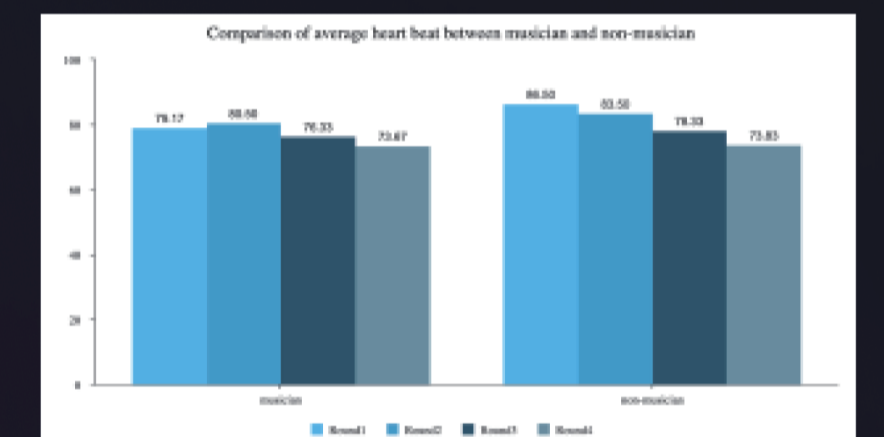
Time performance:

Musicians consistently outpace non-musicians in completing tasks across all rounds. Their musical background potentially imbues them with skills or attributes enhancing gaming performance, leading to shorter round completion times. This suggests musicians' adeptness at navigating the game, edging closer to optimal staff times.



Heart Rate (ECG):

According to the study, **silence is associated with the lowest heart rates**, indicating the emotional impact of music. **The heart rate of the non-musician group remained consistently higher than that of musicians.** Considering this discrepancy, it may be that **musicians are more calm** during intense gaming situations, which could be due to their familiarity with intricate musical stimuli.



Neural Activities (EEG):

Comparing EEG results between non-musicians and musicians reveals nuanced differences. Musicians show adaptable beta wave responses, linked to their musical experiences. Non-musicians exhibit neural convergence during silence. Both groups adapt to low-quality music with an occipital shift.

Exiting Survey:

Participants noted that music eased gameplay and heightened enjoyment, leading to increased relaxation and excitement. Some even attributed improved performance to music's positive influence. Conversely, a subset found music challenging due to distractions and focus issues.

Conclusion and future study

In conclusion, our study underscores the differential impact of music quality on gamers, based on their musical expertise:

- Musicians** performed better in time performance than non-musicians. Musicians also consistently exhibit lower heart rates, **potentially attributed to their ability to remain calm under intense music.**
- We observe that both groups exhibit distinct neural shifts to the occipital area when encountering changes in music quality. There for quality of the music might not be a vital element of affecting their game performance.**
- Unlike hypothesis H2, neither group performed well under the silent condition, challenging the assumption that silence benefits players alike.