

DOES MUSIC TYPE IMPACT EMOTION?

Does Music Type Impact Emotion?

The Effects of Music Type on Emotional Response and Selective Attention

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Abstract

Introduction

The purpose of this study to examine the effects of music type and word category on emotional response and selective attention. Specifically look at if heavy metal or orchestral music may influence accuracy and response time when completing the Stroop task. Word categories within the measure consist of healthy, unhealthy, neutral, and numbers. These are utilized to attempt to understand if an interaction occurs between emotional responses to word category.

Methods

A sample of 13 (12 cisgender female, 1 transgender) undergraduate students initially completed a demographic survey, followed by a musical attribute preferences questionnaire and state-trait inventory for cognitive and somatic anxiety. Following completion of pre-test, participants completed a selective attention measure. An independent samples t-test and two repeated measures ANOVAs were utilized to compute data.

Results

A repeated measures ANOVA revealed a significant effect of word category on accuracy. A secondary RMANOVA was conducted and found that word category interacts with reaction time. There was no significant effect of music type on accuracy or reaction time.

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Conclusion

The aim of this study is to examine if music type influences emotion regulation and selective attention. It was uncovered that word type effects both accuracy and reaction time, while music type does not have a significant effect present.

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Does Music Type Impact Emotion? The Effects of Music Type Emotional Response and Selective Attention

Music has been a tool used for decades to not only bring people together, but to regulate moods, cope with anxiety, and focus. In fact, it has been found that calming music can assist in reducing anxiety (Stewart, et. Al., 2019). Evidence suggests music can influence mood, emotional regulation, and cognitive performance. Specifically, type of music, emotionally eliciting stimuli, and participants music preference may interact. This may lead to impacts on accuracy and response time whilst completing a selective attention measure. This study seeks to deepen the understanding of how music type and word categories influence response time and accuracy.

Music and mood regulation

For many college students, music is a major part of their lives, especially when it comes to mood regulation. Studies show that the youth typically utilize music as a coping mechanism to manage depressive and anxious moods. The majority report utilizing music that differs their current mood to alter its state. Many also report attempts to reduce anxiety by listening to calming music (Stewart, et. Al, 2019). In recent years, there has been an increase in the use of music to improve one's moods. Previous research conducted showed a 51% increase in participants utilizing music to improve their moods during the COVID-19 lockdown. It appears that listening habits changed to reflect the emotional needs of the listeners at that time (Ziv & Hollander-Shabtai, 2022). Testing mood and anxiety shifts can prove to be difficult; one method is through the Stroop task.

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The Stroop task and cognitive interference

The Stroop task is a selective attention measure which can be utilized to measure response time and accuracy. When paired with emotionally eliciting stimuli, cognitive interferences can be discovered. It has been found that state anxiety is the catalyst for those with high trait anxiety as the higher the anxiety, the more hypervigilant the individual typically is. However, the same does not apply for those with low trait anxiety, as avoidance is a common reaction for this group (Egloff & Hock, 2001). It is suggested that when listening to music accelerates emotional processing, whilst increasing the response times as well (Graham, et. Al, 2009). Music can begin to cause cognitive interferences due to emotionally charged stimuli.

Emotionally eliciting stimuli

A similar study conducted by Day and Thompson (2019) utilized emotionally eliciting imagery. It was uncovered that participants are typically experiencing an emotional state from listening to music, prior to exposure to imagery. This illudes to the idea that imagery likely amplifies the existing emotional state of the participant. In contrast, a study completed by Birman and Ferguson (2022) found participants who listened to classical music reported feeling more relaxed and calmer than those in the heavy metal group who report the opposite. This challenges the above idea that participants are experiencing emotional state, prior to imagery. It is possible that individuals apart of our study will exhibit altered reaction times and accuracy, when listening to varied music types (heavy metal or orchestral), and witnessing varying word categories (healthy, unhealthy, neutral, numbers). Potential influences of music type and word category on response time and accuracy when completing a Stroop test, which suggests a possible correlation between the above variables and emotional responses.

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Music type and cognitive performance

In a study conducted by Fernandez, Trost, and Vuilleumier (2019), it was found that participants response faster to visual stimuli when listening to music that is deemed joyful. This is comparative to tender or sad music excerpts. The provides the potential that the orchestral music piece in our study may enhance response time when responding to word categories mentioned above. This is reaffirmed by Cassidy and MacDonald (2007), as they found that high-arousal music impairs Stroop task performance of participants. In contrast, low-arousal music improves performance. Kim (2022) shows that classical music improves Stroop task accuracy, when compared to rock music. Results may vary, especially when looking at musical preferences.

Musical preference and task performance

It is to be noted that results may be influenced by musical preference of participants. It has been found that listening to unpreferred relaxing music can result in lower levels of state-anxiety. In contrast, those who listened to unpreferred stimulative music reported higher anxiety levels (Jiang, et. Al., 2016). In a study conducted by Parente (1976), it was discovered that while there is a statistical significance amongst preferred music, least preferred, and no music groups. Yet, the most and least preferred music type groups differ greatly from the control group, there is no evidence of an impact between the first two groups. Researchers were aware of the above implications and utilized the musical attribute preference questionnaire to gain a better understanding.

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The Present Study

This study aims to explore the effects of music type and word category on selective attention and emotional response by looking at response time and accuracy during the Stroop task. Research has found that not only is music utilized frequently for mood regulation and to manage anxiety, but also shows a cognitive interference that occur. It has also been found that music type affects cognitive performance and the concerns regarding musical preference and task performance. In the present study, researcher will study two randomized groups that will listen to either heavy metal or orchestral music. During which, we will look to determine if selective attention and emotional responses are influenced by the varying groups. The researchers hypothesized that music type and word category will interact with response time and accuracy, showing a correlation with emotional response. The researcher also predicted that word type will influence response time and accuracy, correlating with selective attention and emotional response. Last, researchers theorized that music type influences response time and accuracy.

Method

Participants

Participants within this study included 12 female and 1 transgender college undergraduate students from Southern New Hampshire University. Students ranged from 18 to 38 years old, with a mean age of 22.1 ($SD = 5.36$). Participants reported their class year: freshman (23.1%), sophomore (30.8%), junior (30.8%), and seniors (15.4%). Participants were Caucasian (84.6%), Asian/Pacific Islander (7.7%), and Biracial (7.7%). Convenience sampling was utilized to recruit undergraduate peers. Extra credit was offered for participation.

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Materials

This experiment included a demographic questionnaire, a music attribute preferences questionnaire, state-trait inventory for cognitive and somatic anxiety and a Stroop task.

Stimuli

Participants were randomly assigned either heavy metal or an orchestral song. The heavy metal group listened to *Leviathan* by Jacob Lizotte (2021), at volume 25. The orchestral group listened to *La Mer* by Claude Debussy (2012), at volume 40.

Demographics

The demographics questionnaire asked: age, school year, ethnicity, gender identity, and employment status.

Music attribute preferences questionnaire

This measure to assesses basic music preferences of dynamics, tempo, pitch, and timbre through a self-report questionnaire (Bonneville-Roussy & Eerola, 2018). Participants were prompted with “think about music in general, not a particular genre or song”, followed by “do you like instrumental attributes?” on a 24-item measure, assessing preferences of: acoustic (alpha reliability = .78), forceful (alpha reliability = .82), instrumental (alpha reliability = .81), mellow (alpha reliability = .75), energetic (alpha reliability = .60), and easy-listening attributes (alpha reliability = .63). Participants responded on a 5-point scale (1 = *strongly dislike* to 5 = *strongly dislike*).

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State-trait inventory for cognitive and somatic anxiety (STICSA)

This assesses participants responses to unambiguous statements representative of mental or physical anxiety (Ree, et al., 2008). Participants responded to: “My heart beats fast” on a 42-item measure, assessing how anxiety impacts cognitive and somatic dimensions with subscales of the state and trait levels. Participants answered on a 4-point scale (1 = *not at all* to 4 = *very much so*).

Stroop task

Researchers utilized a single trial, selective attention measure to test participants response time and accuracy. Within the trial, participants are asked to select if words appear between one and four times. The words chosen are deemed as healthy (e.g. *strong*), unhealthy (e.g. *tired*), neutral (e.g. *table*), and numbers (e.g. *three*). Each word type has 32 variations that will appear sporadically, totaling 128 items. Participants listened to pre-selected music during task.

Design

A repeated measures design was utilized to study the effects of music type and word category on response time and accuracy. The independent variables were music type and word category. The dependent variables were the participants response times and accuracy of responses.

Procedure

Students were recruited and voluntarily took part in this study. Participants met individually in designated testing room and were provided informed consent. Then were randomly placed into either the heavy metal or orchestral group. Participants then completed the

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demographic questionnaire, musical attribute preference questionnaire, and STICSA. The Stroop task was completed while listening to selected music. Once completed, researcher debriefed them.

Results

Music Type on Age and Year

An independent samples t-test was conducted to study differences in age and year between participants who listened to orchestral or heavy metal music. See Table 1. No significant differences in age $t(11) = -.662, p = .521$ or year $t(11) = -.894, p = .390, p > .05$, is the baseline for statistical significance. No significant differences in age and year between music types are present.

Music type by word category on accuracy

A repeated-measures ANOVA was conducted with music type and word category as the independent variables, the dependent variable is accuracy. See Table 2. No significant interaction was discovered, $F(3,33) = .388, P = .763, \eta^2_p = .034$, suggesting music type and word category do not influence accuracy. However, a significant effect of words category on accuracy, $F(3,33) = 3.889, P = .017, \eta^2_p = .261$, proposing word category influences accuracy. For music type on accuracy, no significant effect was discovered, $F(1,11) = 1.38, p = .264, \eta^2_p = .11$, music type may not impact accuracy.

Music type and word category on reaction time

Another repeated measure ANOVA was conducted to study the interaction between music type and word category on accuracy. See Table 3. No significant interaction effect occurred

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between word category and music type, $F(3,33) = .879, p = .462, \eta^2_p = .740$. Suggesting that word category and music type do not interact with reaction time. It was found that word category interacts with reaction time, $F(3,33) = 3.274, p = .033, \eta^2_p = .229$, showing word category may influence reaction time. No significant effect exists between music type and reaction time, $F(1,11) = .185, p = .676, \eta^2_p = .016$, suggesting music type does not influence with reaction time.

Conclusion

The purpose of this study was to examine if any interactions occur between music type on age and year, music type by word category on accuracy, and music type and word category on reaction time.

Music Type on age and year

It was found that there is no significant difference residing between age and year in relation to music type, disproving our initial hypothesis.

Music type by word category on accuracy

It was found that there is no statistical evidence of an interaction occur between music type and word category. Disproving our initial hypothesis, however it was found that there is a significant effect regarding word category and accuracy.

Music type and word category on reaction time

There was no significant interaction effect that occurred between music type and word category. However, it was found that word category may influence reaction time. This disproves our hypothesis.

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Strengths and limitations

One major limitation within our study is our sample size being very small with only 13 participants. This is partly due to time limitations, if this study were conducted again it is recommended to gather a larger sample size. Another limitation would be determining the tempo of music prior to testing, as further research revealed that the heavy metal song is a slower tempo than the orchestral piece. One component that could be altered also is utilizing music that matches the tempo of a high vs low heart rate. Conducting this study and research report has allowed me to better my analytic view of research reports, while also gaining a better understanding of the process of conducting a study that is overseen by an IRB.

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Table 1

Descriptives of participants for music type on age and year.

Descriptives

Descriptives			
	Music Type	Age	Year
N	1	7	7
	2	6	6
Missing	1	0	0
	2	0	0
Mean	1	21.1	2.14
	2	23.2	2.67
Median	1	22	2
	2	20.0	3.00
Standard deviation	1	2.79	1.07
	2	7.55	1.03
Minimum	1	18	1
	2	18	1
Maximum	1	26	4
	2	38	4

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Table 2

Repeated Measures ANOVA: Music by word category on accuracy

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Word Cat	14.70	3	4.899	3.889	0.017
Word Cat * Music Type	1.47	3	0.489	0.388	0.762
Residual	41.57	33	1.260		

Note. Type 3 Sums of Squares

[3]

Between Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Music Type	21.0	1	21.0	1.38	0.264
Residual	166.8	11	15.2		

Note. Type 3 Sums of Squares

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Table 3

Repeated measures ANOVA: music and word category on reaction time

Repeated Measures ANOVA: Music x Word cat on RT

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Word Cat	17872	3	5957	3.274	0.033
Word Cat * Music Type	4801	3	1600	0.879	0.462
Residual	60047	33	1820		

Note. Type 3 Sums of Squares

Between Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Music Type	25131	1	25131	0.185	0.676
Residual	1.50e+6	11	135999		

Note. Type 3 Sums of Squares