

Does Time Really Fly When You're Having Fun?

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Introduction

Music is a vital part of society. Music is used in all sorts of situations, from background music being played in stores to a thriving multi-billion dollar industry. The study of music and how it affects us has only recently been popularized, so there has only been a minimal amount of research done. Most of the already existing research has been done in a consumer setting, with a focus on how background music affects consumer psychology. Many models of time perception exist which relate properties of environmental stimulus to the subjective experience of time. Fraisse's 1984 model focuses on environmental change, where a greater number of changes in the state of the environment during a time period would lead to a greater perceived duration of that time period. Ornstein's 1986 storage size model suggests that perceived duration is associated with the amount of memory dedicated to storing stimulus information, and that larger allocations of memory space are associated with longer perceived durations. Zakay's 1989 model is based on attentional processes, where a non-temporal stimulus creates a distraction from the internal clock responsible for the perception of time passage. It is believed that a duration of time filled with music should be perceived differently than the same duration of time filled with silence.

It was found that many factors in retail environments act as stimuli, with music playing a big part. In 1983, Zakay, Nitzan, and Glicksohn demonstrated that there was a longer perceived time associated with awareness of the environment. Background music has been shown to affect the length of time consumers spend in stores, their perceptions of the amount of time they spent shopping, and the enjoyment of customers.

Interestingly, younger shoppers felt they shopped for a longer period of time when they were exposed to adult-oriented background music, while older shoppers felt they had shopped

for a longer period of time when exposed to youth-oriented background music (Yalch & Spangenberg, 1993). Another study done by Yalch and Spangenberg in 1993 showed that actual shopping time was longer in the less familiar background music, but perceived shopping time was longer in the more familiar background music. A third study done by Yalch and Spangenberg again in 2000 showed that people spent less time shopping when familiar music was played in the background.

The same 2000 study by Yalch and Spangenberg also looked at the enjoyment of the customers. They did this by measuring two basic dimensions of response to the environment - pleasure and arousal. Participants in this study reported greater pleasure when unfamiliar music was played in the fixed time condition, but reported greater arousal when familiar music was played in the variable time condition.

A study by North and Hargreaves in 1998 further expands past studies, and studied musical tempo and time perception in a gymnasium rather than in a retail setting. By manipulating the tempo of music being played, the researchers were able to influence the perceptions of time passage of the participants. The study showed that while musical tempo did not influence time duration estimates in any one particular direction, slow music led to a greater degree of inaccuracy in estimations that did fast music.

The Current Study

Shifting the focus of research relating to music and time away from just retail is important, as it may serve as the basis for future research as well as deepening the understanding of time perception. Increasing research in this field would be beneficial to many because of all the

possible effects these results can have on the future development and advances of the music industry.

In general, there has been exceptionally little research looking specifically at the influence of music on time perception. The researchers came up with questions for further research to address this lack of research. In order to further understand the influence of music on time perception, the following hypotheses were tested:

H1: Compared to participants exposed to slow-pace music, participants exposed to fast-pace music will perceive a time interval to be longer and the task more enjoyable

H2: Compared to participants exposed to classical music, participants exposed to pop music will perceive a time interval to be shorter and the task less enjoyable.

Methods

Design & Procedure

The design of the study was a 2 (tempo: fast vs classical) x 2 (genre: classical vs pop) [between subjects] factorial design. A power analysis was used to determine the sample size for this study, which would consist of approximately 125 ninth grade students between the ages of 13 and 14 from Roslyn High School. The sample would consist of both males and females, and it was believed that people of various races and ethnicities would be represented as well.

Participants were recruited during five randomly selected Global History 1 regents classes. The researchers visited the classes to introduce themselves to the students and explain their intention to conduct a research project based on how creativity is correlated with one's ability to solve Rebus puzzles. The researchers explained that participation in this study was

voluntary and that all students who participate in the study will receive candy at the completion of their participation. The assent form was signed by the participants right before they participated.

To protect participants' privacy, there were no questions on the survey or the task where they needed to disclose any identifiable information, such as their names and/or addresses. All participants handed in their tests and surveys in a manila folder so no one could distinguish between whose results were in which folders. All data collected was destroyed at the completion of this study.

Scripts

Introduction Script:

Hello, my name is Jasmine Ting/Jeffrey Yu, and I am doing a school research project. I was wondering if any of you would be willing to participate and take a really short puzzle solving challenge. It won't take that long. Participation is completely voluntary, and upon completion of your survey after the puzzle solving challenge, you will get candy. No personal questions will be asked during the task or the short survey after, and all results will be kept anonymous. This is a really fun task, and I hope that many of you decide to participate. Do any of you have any questions?

Testing Script:

Thank you so much for agreeing to participate in our experiment. Please put away all electronics and/or anything that could distract you, including phones, iPads, and watches. When I say go,

please open the folder and try to complete as many puzzles as you can before I stop you. You do not have to go in order or finish. Keep in mind that you can drop out of this task at any time.

Ready, set, go.

Survey Script:

Time is up; please flip over the page and put your pencils down. Now you will be taking a short survey based on the task you have just completed. Please flip over the green page. You may take as much time as you need to complete this survey. At the completion of your survey, please put it back in the folder with your puzzle sheet. Do not go back to the puzzle sheet. Please raise your hand when you're done, and one of us will come to collect your folder and give you your candy.

Thank you for your participation.

Classes were randomly assigned to each condition of the study. At the completion of the allotted time, which the participants were not told, the participants were told to complete a survey [with questions including] their familiarity with the music and how much time the participant thought had passed, in minutes and seconds. Also included in the survey were manipulation checks on tempo and genre, as well as questions to [establish] demographics.

Participants

Participants were 112 ninth grade students from Roslyn High School (54.4% male, 45.6% female). Racial composition was 68.2% white, 2.3% black, 1.1% Indian/Alaskan Native, 6.8% Hispanic, 14.8% Asian, 3.4% multiracial, and 3.4% other.

Experimental stimuli

The independent variable was the tempo and the genre of the music. The independent variable was presented as background music that was playing while the participants completed their task. A copy of the test is shown below. The independent variable was controlled with a [constant decibel level] and music exposure duration across all conditions.

To manipulate the independent variables, the researchers chose four different tracks that fulfilled previously established ranges that would classify the tempo as fast or slow, as well as the [needed] genre. A track with a tempo of greater than 120 bpm was considered fast, and a track with a tempo of less than 80 was considered slow (North, Hargreaves, & Heath, 1998).

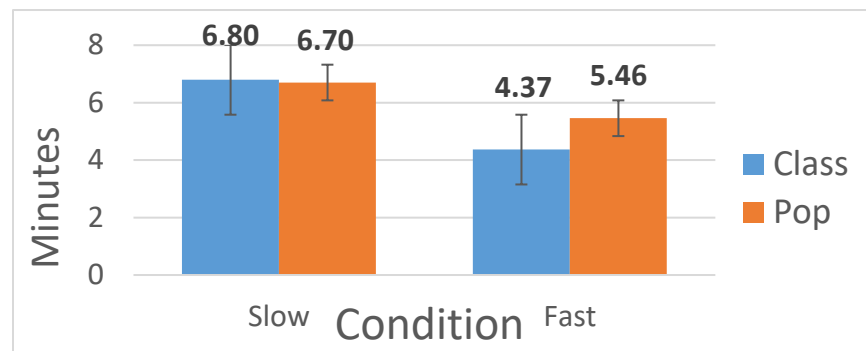
Dependent measures

The dependent variable was time perception. In this case, that meant how much time the participant thought had passed after the completion of the music exposure. To ensure that these results would be solely based on the participant, all time measuring devices were either be turned off, covered, or removed for the duration of the experiment. Participants were asked how long they thought it took them to complete the testing portion of the experiment in minutes and seconds. Familiarity was measured with a nine item bipolar adjective scale adapted from Mehrabian and Russell's (1974) semantic differential measure of emotional state. The survey showed reliability with a Cronbach's Alpha of 0.880. All survey items can be found in [Appendix X].

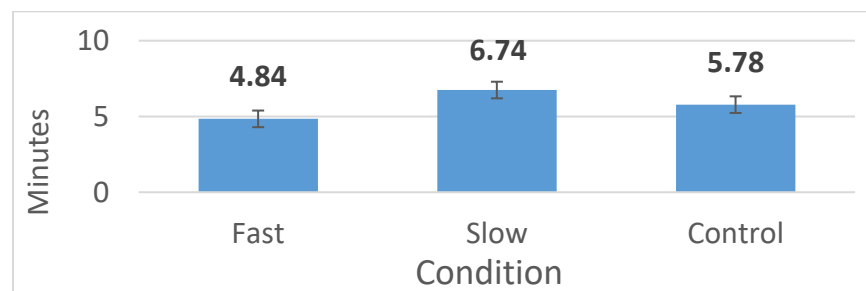
Results

Music Effects on Time Perception

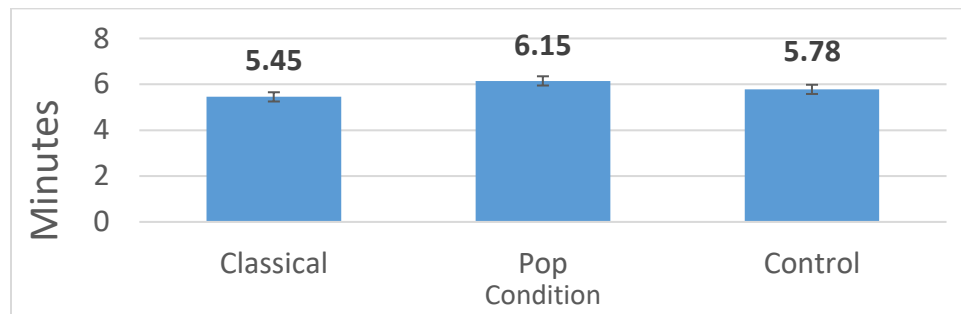
The participants' estimations of time were analyzed. The five groups yielded mean results ranging from 262 seconds in the fast classical group to 408 seconds in the slow classical group. The mean results of the other groups in increasing order are 327 seconds in the fast pop group, 347 seconds in the control group, and 402 seconds in the slow pop group. Upon running a two-way analysis of variance, there was found to be no interaction between tempo and genre. $F(1, 107) = .949, p=0.332, np^2=0.162$. This is depicted below in *figure TBD*



However, the analysis of variance revealed that tempo did have a significant main effect on time perception. $F(1, 107) = 0.670, p=.0415, np^2=0.128$. This is depicted below in *figure TBD*. The fast tempo groups with a mean of 290 seconds were significantly less than slow tempo groups with a mean of 405 seconds. This indicates that fast tempo groups perceived the time period to be faster than slow tempo groups, contrary to our hypothesis. However, neither groups were significantly different from the control group.

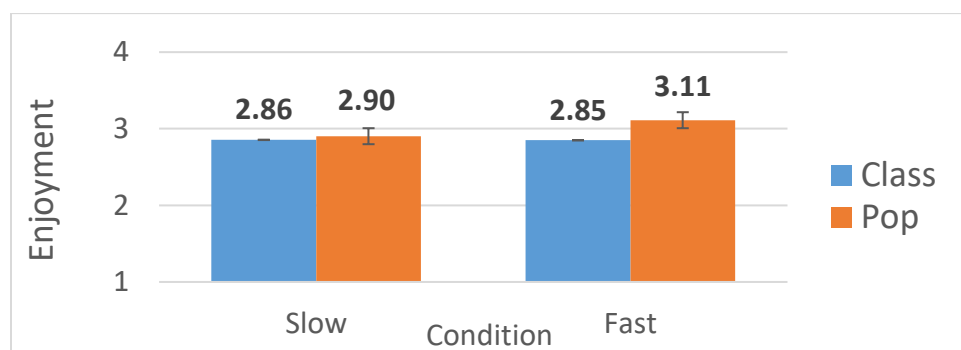


In addition, the analysis of variance showed that genre had no significant main effect on time perception. $F(1, 107) = 0.670, p=0.415, np^2=0.128$. This is depicted below in *figure TBD*. The classical genre groups had a mean of 327 seconds and the pop genre groups had a mean of 369 seconds. Neither groups were significantly different from one another, or from the control.

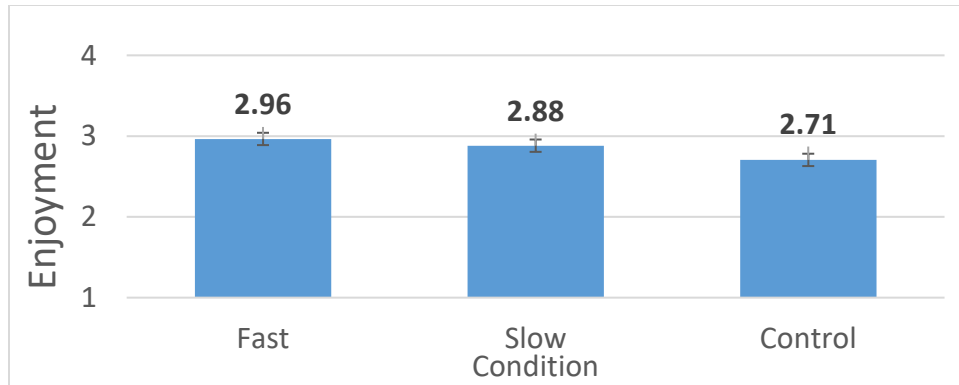


Music Effects on Enjoyment

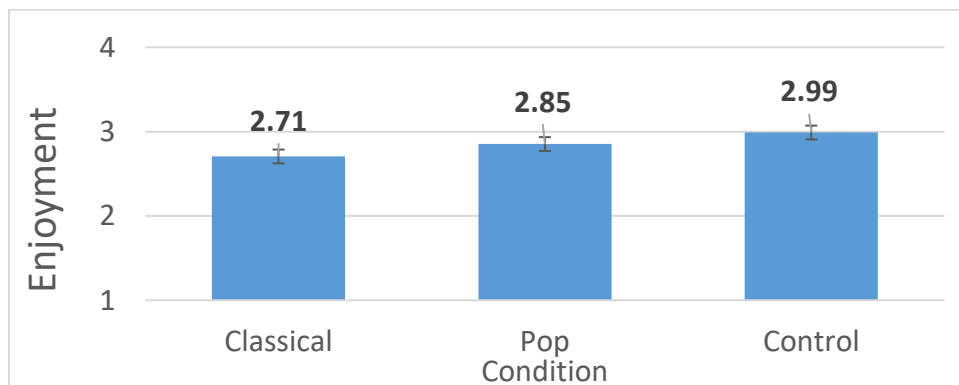
Responses to the nine item bipolar adjective scale adapted from Mehrabian and Russell's (1974) semantic differential measure of emotion state were analyzed. (Cronbach's alpha = 0.880) Each participant's response was averaged with a score of four indicates maximum enjoyment and a response of one indicates minimal enjoyment. The five groups yielded mean results ranging from 2.71 in the control group to 3.11 in the fast pop group. The mean results of the other groups in increasing order are 2.85 in the fast classical group, 2.86 in the slow classical group, 2.90 in the slow pop group. Another two-way analysis of variance showed that there was no significant interaction between tempo and genre based on enjoyment. $F(1, 101) = 0.552, p=0.459, np^2=0.114$. This is depicted below in *figure TBD*



The analysis of variance also revealed that there was no main effect of tempo on enjoyment, contrary to our hypothesis. $F(1, 101) = 0.498, p=0.482, np^2=0.108$. This is depicted below in *figure TBD*. The fast tempo groups had a mean of 2.96 and the slow tempo groups had a mean of 2.88. Neither groups were significantly different from one another, or from the control.



In addition, the analysis of variance showed that genre had no significant main effect on enjoyment. $F(1, 101) = 1.137, p=0.289, np^2=0.184$. This is depicted below in *figure TBD*. The classical genre groups had a mean of 2.85 and the pop genre groups had a mean of 2.99. Contrary to our hypothesis, neither groups were significantly different from one another, or from the control.



Discussion

The purpose of this study was to examine the effects of tempo and genre of music on time perception and enjoyment. The current study is different from previous ones as it was conducted in a school setting on students, as opposed to a consumer setting. Many of the findings in this study were surprising and unique, contradicting previous research.

Contrary to the hypotheses, a period where slow tempo music was played was perceived as longer than when fast tempo music was played. This indicates that fast paced music caused participants to perceive time as passing faster, therefore the time interval being shorter. This contradicts previous studies by Kellaris & Altsech (1992) and Palmquist (1990). Instead, these results support common sayings such as “time flies when you’re having fun” and “a watched pot never boils,” suggesting that a time interval filled with positive stimulation will be perceived as shorter. It is believed that the contradicting results may be due to the task type. The current study used Rebus Puzzles, which were overall rated as enjoyable. However, the level of engagement and boringness may differ from previous studies that were conducted while customers shopped in a consumer setting. Boredom has been shown to cause individuals to perceive time as passing more slowly (Watt, 1991). Further research needs to be conducted to determine how tempo effects time perception.

In addition, contrary to the hypotheses, it was also surprising that genre had no effect of time perception. Previous studies have shown that listeners of familiar music, labeled as “contemporary” or “pop”, perceived a time interval as longer than listeners of unfamiliar music, labeled as “easy listening” or “classical” (Yalch & Spangenberg, 2000). Although the current study used similar measures when choosing songs, all vocals were removed to eliminate it as a

confounding variable. This may have resulted in participants not being to recognize the song and not yielding the same results as previous studies.

Turning to the effects of tempo and genre of music on enjoyment, contrary to the hypothesis, no significant differences were found. In previous studies, differences in modality, defined as the configuration of intervals between pitches that comprise a scale, of music were found to have an effect on product evaluation, having major key music resulting in most positive evaluation and atonal music with least positive evaluation (Kellaris & Kent, 1992). It would be expected that tempo of music would yield a similar result, however no significant differences in enjoyment were found in the current study. Previous research also found that participants reported greater pleasure and sense of dominance when playing unfamiliar music than familiar music (Yalch & Spangenberg, 2000). It was expected that classical genre music would yield greater enjoyment than pop genre music, but no differences were found.

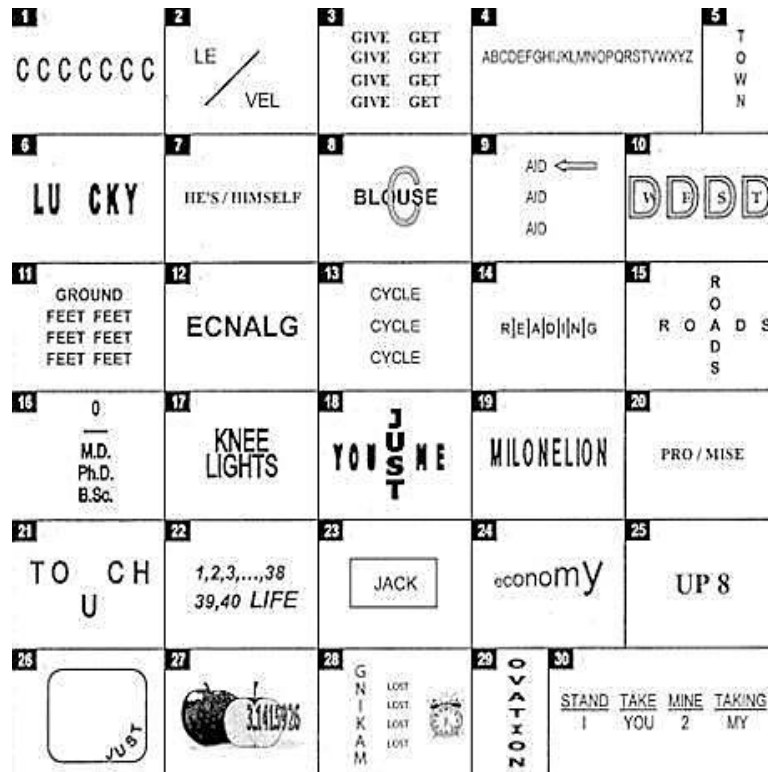
One possible explanation for the lack of meaningful results is the current study used a relatively short, fixed time period for when the music was played. The music was only played for four minutes and forty-three seconds, while many other studies had variable time periods where participants choose how long they listened to the music. The short, fixed period of time may not have allowed the music to fully affect participants' enjoyment of the task or their perception of time. Another possible explanation is that time perception and enjoyment were measured immediately after listening to the music and completing the task. This may have been a concurrent perspective (Yalch & Spangenberg, 2000), rather than a retrospective experience of duration. Future research should measure time perception days after the initial listening.

Conclusion

This study is noteworthy as it is one of few studies that examined the effects of music in a non-commercial setting, presenting results that contradict previous studies. The study suggest that those exposed to fast-paced music experience a duration of time longer than those exposed to slow-paced music, genre of a piece of music has no effect on time perception, and both tempo and genre of a piece of music have no effect on enjoyment. These findings are unique and provide insight into how music affects human behavior. More research must be conducted in this realm to clarify much of what is still unknown.

Appendix

Rebus Puzzle Task



Enjoyment of Task Scale

Unhappy	—	—	—	—	Happy
Annoyed	—	—	—	—	Pleased
Unsatisfied	—	—	—	—	Satisfied
Depressed	—	—	—	—	Contented
Despairing	—	—	—	—	Hopeful
Bored	—	—	—	—	Relaxed
Sluggish	—	—	—	—	Frenzied
Restricted	—	—	—	—	Free
Disinterested	—	—	—	—	Interested

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