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Impact of Music on Categorical Facial Perceptions

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Abstract

This paper explores the effect music has on inducing an emotion that impacts a person's perception of facial expressions through two experiments. Previous research suggests that music has a significant impact on a person's mood and a vast amount of research has been conducted analyzing facial perception. Extending previous literature, this study will investigate how the impact music has on a person's mood can affect the way a person perceives the facial expression of another. Experiment 1 uses the anchor effect to highlight the ability music has to anchor a person's mood powerfully enough to influence that person's perception of a given facial expression. Experiment 1 will use 96 Caucasian college students to test the independent variable of music to measure the effect it has to alter the subject's perception of facial expressions on a facial continuum. Each of the three subject groups (happy-music, sad-music, no-music) will complete a categorical facial perception task. The results will be consistent with previous literature and show that both happy and sad music impact the subject's perception of facial expressions relative to the no-music group. Experiment 2 analyzes the influence that the other-race effect has on impacting the results demonstrated in Experiment 1. Experiment 2 will use 192 Caucasian college students to test the independent variables of music and race of faces perceived (own-race, other-race) to measure the effect they have on altering the subject's perception of facial expressions on a facial continuum. The results will validate Experiment 1 by showing that both happy and sad music impact the subject's perception of facial expressions relative to the no-music group regardless of whether the perceived faces were own-race or other-race. The results will also show no statistically significant interaction between the music condition and the race of face perceived condition, however slight increases in the impact of music were observed.

Keywords: Facial Perception, Music, Emotion, Mood, Anchor Effect, Other-race Effect

Literature Review

Categorical Perception of Facial Expressions:

The initial research conducted on facial perception provided evidence to show that the mechanisms involved in the human facial perceptual system are similar to those of monkeys suggesting a common evolutionary basis. The researchers concluded from this initial research that certain populations of neurons in monkeys were adapted for perceiving facial expressions and recognizing facial identity (Hasselmo et al., 1989).

As the research focus shifted to the specifics of the human processes involved in perception of facial expression, a clear direction was to locate the brain regions responsible for perceiving facial expressions. Etcoff (1984) analyzed patients with brain lesions on the right hemisphere and the left hemisphere of their brains and compared their respective abilities to perceive facial expressions to a control group of healthy brain participants. The results of this study showed that patients with damage to the right cerebral hemisphere have significantly impaired abilities in discriminating identity as well as perceiving emotional expressions in faces compared to the patients with damage to the left cerebral hemisphere and to healthy participants. These results were crucial to identifying the location of the brain mechanisms involved in the process of perceiving facial expression and further advanced the research on this topic (Etcoff, 1984).

Following up her own research on the effects of brain lesions' influence on a person's ability to perceive facial expressions, Etcoff conducted research exploring how emotions are analyzed differently when paired together (Etcoff & Magee, 1992). This research was done to investigate whether the perception of facial expressions is a categorical phenomenon. That is, do people perceive different levels of an emotional expression categorically as a specific emotion or is there a continuum of expression where the lines blur as the expression switches from one

emotion to another. Specifically, Etcoff investigated the way people perceive facial expressions as they changed from one extreme end of a continuum to another (e.g., extreme happiness to extreme sadness) in order to discover whether the less extremes of the given opposing emotions can still be perceived and categorized into emotions in the same way as the extreme expressions are categorized (Etcoff & Magee, 1992).

More specifically, the researchers hypothesized that people are able to categorize facial expressions into the basic six expressions of happiness, sadness, fear, anger, disgust and surprise easily when the images of these faces are shown alone. This study analyzes the differences in how people perceive facial expressions on facial expression continuums of pairs of these emotions (i.e. happiness and sadness, anger and sadness, etc.) The researchers analyzed the percentage of identifications among the participants and found that in face images 3-6 the majority of the emotional switches were observed along the 9-face facial expression continuum. Results showed that facial expressions of happiness, sadness, fear, anger and disgust are perceived categorically, however surprise was deemed too similar to other emotions to be categorized, so the researchers excluded surprise from the basic five emotions. The results showed that the differences in facial features that were closer to the boundaries of extreme happiness or extreme sadness were perceived significantly more accurately than the facial expressions that were less extreme and were closer to the center of the continuum. Effectively, the emotional categories get blurred and lead to less accurate perceptions of the facial expressions the less extreme and defined are the facial expressions. This confirms the researchers' hypothesis that facial expressions are perceived categorically.

Specific populations ability to perceive facial expressions

Once the concept of categorical perception had been established with no clear evidence of gender differences, research moved toward investigating the influence that physical and mental impairments have on a person's ability to perceive emotions in facial expressions.

Physical

Jacobs et al., (1995) conducted a study in order to analyze the impact of Parkinson's Disease (PD) on a person's ability to perceive facial expressions. Because Parkinson's Disease directly affects the basal ganglia's functions (i.e. control of voluntary motor movements), studying PD patients helped determine the brain systems involved in the perception of facial expressions. Results showed that PD patients had significantly lower ability on the emotional facial affect perception tasks used in this study compared to the control group of participants without PD. This study also analyzed the differences between PD patients and healthy participants on an object imagery task. The results showed that the PD patients received similar scores to the healthy participants and therefore showed no impairment on the object imagery task. The results of this study suggest that the basal ganglia are a crucial brain system involved in the perception of facial expression. The research here not only identifies a brain mechanism that is essential to a person's ability to perceive facial expressions, but also offers evidence that a mental system impairment can have a significant influence on a person's ability to perceive facial expressions (Jacobs et al., 1995).

Mental

Alongside the influence of Parkinson's Disease on a person's ability to perceive facial expressions, a vast amount of research has been done analyzing the effect that depression has on this ability as well. A study conducted by Persad & Polivy (1993) analyzed the performance of

depressed and non-depressed college students alongside the performance of depressed and non-depressed psychiatric patients on a facial emotional expression perception task. The researchers found that the two depressed groups scored significantly lower than the non-depressed patients on the perception task, which provides evidence that depressed individuals are significantly less proficient in their ability to properly perceive facial expressions than non-depressed individuals. This study provides evidence that a person's mental state can influence their ability to perceive facial expressions.

Anchoring and Adjustment in Categorical Perception of Facial Expression

A study conducted by Calder & Etcoff et al. (1996) offers an explanation as to why the emotional state of a person influences their ability to perceive facial expressions. This study suggests that a person's pre-test emotional state serves as an anchor to the categorical perception of a facial expression task. The anchoring and adjustment effect is a theory brought forth by Tversky & Kahneman (1974). Their study showed that presenting a subject with an anchor can cause that subject's decision to adjust to the present value and therefore alter the subject's answer accordingly. Essentially, the different starting points that the anchor creates, impacts the subject's estimate, consequently creating a bias towards the initial value (Tversky & Kahneman, 1974).

Tversky and Kahneman's concept of an anchor can be applied to Calder and Etcoff et al.'s 1996 study. The results suggest that a person's emotional state or pre-test mood can serve as an anchor for their categorical perception of facial expressions. In other words, the researchers found that if a person is in a sad mood during a facial perception task, it affects where on a facial continuum from sad to happy the participant categorizes the sad faces versus the happy faces. Sad participants are more likely to perceive more facial expressions as sad than a participant in a

neutral or happy mood. This study in particular mentions the anchor effect on perception of facial expression to explain why they used a continuum of facial expressions without endpoints (i.e. fear → happiness → anger → fear) all in one continuum. The researchers do this in order to eliminate the anchor effect from the results that could have influenced the slight difference they demonstrate between the single continuum and multiple continuums of facial expressions used in this study. This study further confirms that people perceive facial expressions categorically by extending the facial expression continuum to include more than two emotions. This research also suggests that the use of a single continua can leave the perception open to bias created by the anchor effect of the participants' pre-test mood.

Influence of Happy and Sad music to elicit emotion responses

One explicit factor that has been proven to influence a person's mood through countless studies is music (Scherer & Zentner, 2001; Juslin et al., 2013; Kreutz et al., 2007; Lundqvist et al., 2009; Bullock et al., 2018). Some theorists argue that music can induce basic emotions including happiness and sadness (Kreutz et al., 2007). Recent research conducted by Bullock et al., 2018 analyzes the effects that happy versus sad music have to induce different autonomic emotional expressions. This study shows evidence that different emotional types of music (i.e., happy vs. sad) can cause changes to a person's mood. This study required the participants to fill out a pre-test questionnaire that used a Likert scale from 1-7 in order to establish a baseline score for each subject's current mood. The researchers then played four excerpts of happy music in a randomized order for half of the participants and played four excerpts of sad music in a randomized order for the other half of the participants. All eight musical excerpts were taken from various films and only the instrumental versions were played instead of vocal music (Bullock et al., 2018). *See Table 1.* The researchers measured each participant's heart rate, skin

conductance level (finger temperature) and respiratory rate during the pre-test questionnaire and the listening portions of the study. The subjects were then asked to answer a final questionnaire asking about each subject's current mood. After comparing the pre-test and post-test questionnaires, the researchers concluded that happy music evoked significantly more happiness in the participant's mood, higher skin conductance level and higher respiratory rate while sad music evoked significantly more sadness in a participant's mood, and no change in the participant's physiological measurements (Bullock et al., 2018). This study shows significant evidence to support the notion that different emotional types of music can elicit a change in a person's mood accordingly.

In a study conducted by Buohuys et al. (1995) the researchers analyze the impact that music has on how people perceive ambiguous facial expressions. The researchers discuss previous works to validate the theory of cognitive distortion (Beck et al., 1979) which states that negatively distorted thinking affects a person's judgement and perception of emotional stimuli. The researchers discuss this theory in conjunction with another study which found that depressed patients misinterpret neutral faces as sad faces and happy faces as neutral (Gur et al., 1992). Based on this, the researchers hypothesized that when people are feeling depressed, they will perceive more sadness and rejection and less happiness and invitation in facial expressions (Bouhuys et al., 1995). The researchers determined that a depressed mood would have an impact on how the participants perceive ambiguous facial expressions in particular. In order to establish a mood in the participants, the researchers used either depressing or "elated" or happy music. The music was played while participants completed the facial perception task in order to analyze how different mood inducing music could influence the participant's perceptions of the ambiguous faces given in the study. The researchers compared the results of the two groups and

were able to support their hypothesis. They found that the participants who were listening to the depressing music, and therefore perhaps feeling more depressed, perceived more rejection and sadness in the ambiguous faces.

The work of Buohuys et al., (1995) provides evidence that not only can music impact a person's mood, but further supports the notion that a person's mood impacts their perception of facial expressions. This study shows the impact of music on a person's facial perception, however the researchers did not use a categorical continuum for the facial perception task and did not thoroughly explain the specific musical types used in their experiment. Further research should be conducted in order to add to the work of Buohuys et al., (1995) on the effects of music on facial perception.

Experiment 1

Aim of Current Study

Many researchers have analyzed the effect that different pre-test moods have on influencing how a person perceives facial expressions and extensive research has been done analyzing music's ability to impact a person's mood. However, there is scant research done analyzing the influence music has on person's perception of facial expressions. The aim of the proposed study is to combine these theories in order to discover the impact of music on influencing a person's facial perception of faces along a continuum ranging from extreme happiness to extreme sadness. The proposed study is designed to test the belief that music can serve as an anchor for the participants' moods, causing the participants' perceptions of the facial continuum to be altered according to what emotion the music elicits. The proposed study will only focus on the implications of sad and happy music.

Hypotheses

The following hypotheses will be tested in the current proposed study:

Hypothesis 1: Based on the anchor effect, I believe that participants who listen to happy music during the categorical facial perception task will be influenced to be in a happy mood and will therefore mark the switch from happy to sad faces on the continuum higher than the subjects in the no-music group leaving more happy faces than sad faces perceived on the facial continuum relative to the no-music group.

Hypothesis 2: Based on the anchor effect, I believe that participants who listen to sad music during the categorical facial perception task will be influenced to be in a sad mood and will therefore mark the switch from happy to sad faces on the continuum lower than the subjects in the no-music group, leaving more sad faces than happy faces perceived on the facial continuum relative to the no-music group.

Method

Participants

The proposed study will include 96 Caucasian participants (no gender distinction) in its sample from the five Claremont Colleges. Because there are three groups, there will be 32 participants per group. The students will be recruited through Claremont McKenna College's Sona System, a database used by undergraduate students to participate in research studies in exchange for credit toward their psychology course requirements. The students will receive a full research credit for their participation in the proposed study. The students will range in age from 18 to 24 years old.

Design

The proposed study is a between-subjects design with three levels of the independent variable, which is music: happy, sad, none (control). The proposed study is designed to test the impact that different emotional types of music have on influencing the subject's response to a categorical facial perception task. The dependent variable is the average rating on the categorical facial perception task.

Materials

Each participant will receive noise cancelling headphones that will be administered before beginning the experiment in order to eliminate any external distractions and ensure that the only auditory influence the participants have is the instrumental music they hear. A categorical facial perception task which will be administered on a computer in a private room will feature a continuum of 11 Caucasian male facial expressions ranging from extreme happiness to extreme sadness. Four happy songs and four sad songs that were chosen from a previous study conducted by Bullock et al., (2018) will be played through the noise cancelling headphones through an mp3 file that will be downloaded to iTunes. *See Table 1.* The music will be different based on which group the participant is in (happy, sad, or no music). Within the two music groups, there are four different happy songs and four different sad songs, so eight participants will listen to each song in the proposed study.

Procedure

All research will be conducted with only one participant at a time. Participants will receive a consent form that requires their signature in order to participate in the proposed study when they first arrive. All participants will then enter the research room and sit down at the table in front a computer. The researcher will then explain to the subject that they will be doing a short

activity on the computer and be asked to read and follow the directions as instructed on the computer. The researcher will then administer noise cancelling headphones and prompt the participant to put on the headphones and begin the experiment. Although, the music will be different depending on which group the participant is in, the categorical perception of facial expressions that is administered on the computer will be consistent across all conditions. The researcher will then leave the room and the participant will begin the perception of facial expressions task. The first screen on the computer portion of the experiment will explain the instructions of the experiment and ask the subject to click the spacebar when they are ready to begin. If the participant is part of one of the two with-music groups, the music will begin to play through the headphones immediately when the subject clicks the spacebar and will continue playing for the duration of the experiment. If the subject is part of the no-music group, then no music will play throughout the duration of the experiment. The next 20 screens that appear on the computer will have a continuum of 11 facial expressions of Caucasian males ranging from extreme happiness (left) to extreme sadness (right). Underneath the facial expression continuum, there will be a slider scale that the participant was instructed to move to where they believe the switch between happy and sad facial expressions occur. Once the participants move the slider and click down on the mouse signaling their decision of where the switch occurs between happy and sad facial expressions, a new facial continuum with a slider scale underneath will appear on the screen. Once the participant has finished the 20 variations of the categorical facial perception task, if there was music playing, the music will stop playing and a debriefing screen will pop up thanking them for their participation and informing them that they will receive a credit toward their psychology course requirements. It will also ask them to leave the headphones on the desk

and to go find the researcher for further instructions. The researcher will thank each subject for their participation and then the experiment is complete.

Results

A one-way between-subjects ANOVA on the dependent variable of average score on the categorical facial perception task will be conducted in order to analyze the results of the proposed study. In the proposed study, participants in the happy-music group will mark the switch from happy to sad significantly higher (closer to extreme sadness) than the no-music control group will. This will confirm hypothesis 1, which states that participants who listen to happy music during the categorical facial perception task will be influenced to be in a happy mood and will therefore mark the switch from happy to sad the faces on the continuum higher leaving more happy faces than sad faces relative to the control group. The participants in the sad-music group will mark the switch from happy to sad significantly lower (closer to extreme happiness) than the no-music control group will. This will confirm hypothesis 2, which states that participants who listen to sad music during the categorical facial perception task will be influenced to be in a sad mood and will therefore mark the switch from happy to sad faces on the continuum lower than the subjects in the no-music group leaving more sad faces than happy faces perceived on the facial continuum relative to the control group. *See Figure 1.*

Discussion

The results are expected to fit with both hypotheses because they were grounded in the previous research literature. The different emotional types of music presented to each participant induces the anchor effect which establishes a mood congruent to the emotion of the music throughout the duration of the categorical facial perception task. The anchored mood of the participants influenced the way each participant perceives the facial expressions on the

continuum. The participants who listened to happy music during the experiment should mark the switch from happy to sad faces on the facial continuum higher, leaving more happy faces than sad faces relative to the control group. Basically, the results of the experiment will demonstrate that happy music influences the participants to perceive the more ambiguous facial expressions on the facial continuum as happy faces more often than sad faces. Similarly, the participants who listened to sad music during the experiment should mark the switch from happy to sad faces on the facial continuum lower, leaving more sad faces than happy faces relative to the control group. Essentially, the results of the experiment suggest that sad music influences the participants to perceive the more ambiguous facial expressions on the facial continuum as sad faces more often than happy faces. These findings support the theory that a person's mood can be anchored by music because the results provide evidence that music influences a person's perception of facial expressions.

Because the proposed study only analyzes Caucasian participants' perceptions of solely of Caucasian male facial expressions, the results will be limited to apply to a small portion of the population, so additional research investigating the effects music has on influencing perceptions of facial expressions should be tested with faces of a more diverse population of races in order to discover whether music can have an impact on racial biases in facial perception. Experiment 2 will address this limitation.

Experiment 2

Other-race effect in Facial Perception

Research conducted by Lindsay et al. (1991) provides evidence to support the other-race effect in facial perception tasks. The other-race effect basically theorizes that facial recognition and perception tend to be better for faces of the subjects' own race rather than for faces of other

races (Brigham & Malpass, 1985). Lindsay et al. (1991) analyze the other-race effect by running a variation of a facial perception task on African American and Caucasian undergraduate students at Williams college. The researchers presented each subject with a series of faces, both African American and Caucasian, and asked them to determine what emotion the faces were expressing. The researchers then analyzed the accuracy of each participants' facial perceptions. The results showed that Caucasian subjects performed significantly better on Caucasian faces than they did on African American faces, while African American subjects did not demonstrate significant differences in the accuracy of facial perceptions between the racially diverse sets of faces. These results confirm previous research conducted on the other-race effect which found evidence that the other-race effect is larger among Caucasian subjects than among African American subjects (Sheperd, 1981).

Chance & Goldstein (1981) offer an explanation as to why the other-race effect is so apparent in facial perception tasks. The researchers focused their experiment on discovering the depth of processing that Caucasian subjects use when perceiving faces of African Americans, Japanese people, and as a control, Caucasian people's faces. The results showed that Caucasian faces elicit deeper processing response for the Caucasian subjects than the African American or the Japanese faces do. From the vast amount of research conducted on the other-race effect in regards to facial perception bias, it is clear that Caucasian subjects are able to more deeply process expressions of faces of their own race than expressions of other-race faces and therefore, they are able to more accurately perceive the expressions of faces of their own race.

Aims of Current Study

Based on the research done on the other-race effect, I believe that the Caucasian subjects will more deeply process expressions of their own-race faces relative to the expressions of other-

race faces. This deeper processing leads me to believe that Caucasian subjects will be highly susceptible to the music induced anchor effect when perceiving the expressions of other-race faces rather than own-race faces in the proposed study.

Hypotheses

The following hypotheses will be tested in the current proposed study:

Hypothesis 1: Based on the other-race effect, I believe that participants will be more influenced by the music condition in their perceptions of the other-race facial perception continuum than in their perceptions of their own-race facial perception continuum.

Hypothesis 2: Based off the anchor effect, I believe that participants who listen to happy music during the categorical facial perception task will be influenced to be in a happy mood and will therefore mark the switch from happy to sad faces on the continuum higher than the subjects in the no-music group, leaving more happy faces than sad faces relative to the no-music group perceived on the facial continuum regardless of the race of the faces presented.

Hypothesis 3: Based off the anchor effect, I believe that participants who listen to sad music during the categorical facial perception task will be influenced to be in a sad mood and will therefore mark the switch from happy to sad faces earlier on the continuum lower than the subjects in the no-music group, leaving more sad faces than happy faces perceived on the facial continuum relative to the no-music group regardless of the race of the facial continuums.

Method

Participants

The proposed study will include a new set of 192 Caucasian participants (no gender distinction) in its sample from the five Claremont Colleges. Because there are six groups, there will be 32 participants per group. The students will be recruited through Claremont McKenna

College's Sona System, a database used by undergraduate students to participate in research studies in exchange for credit toward their psychology course requirements. The students will receive a full research credit for their participation in the proposed study. The students will range in age from 18 to 24 years old.

Design

The proposed study is a 2 (own-race facial continuums & other-race facial continuums) x 3 (music: happy, sad, no-music (control)) between-subjects factorial design. The proposed study is designed to test the impact that different emotional types of music have on influencing the subject's response to a categorical facial perception task with own-race and other-race faces. The dependent variable is the average rating on the categorical facial perception task.

Materials

Each participant will receive noise cancelling headphones that will be administered before beginning the experiment in order to eliminate any external distractions and ensure that the only auditory influence the participants have is the instrumental music they hear. A categorical facial perception task will be administered on a computer in a private room that will feature either a continuum of 11 African American male facial expressions or a continuum of 11 Caucasian male facial expressions, depending on which group the participant is in. However, both facial continuums will feature facial expressions ranging from extreme happiness to extreme sadness. The only alteration from Experiment 1 is the race of the faces in the categorical facial perception task. Four happy songs and four sad songs that were chosen from a previous study conducted by Bullock et al., (2018) will be played through the noise cancelling headphones through an mp3 file that will be downloaded to iTunes. *See Table 1.* The music will be different based on which group the participant is in (happy, sad, or no music). Within the two music groups, there are four

different happy songs and four different sad songs, so eight participants will listen to each song in the proposed study.

Procedure

The procedure will be the exact same as Experiment 1 for each participant. The only difference is the alteration to the race of the faces used in the facial perception continuum. See Experiment 1 procedure for details.

Results

One 2 (own-race facial continuums & other-race facial continuums) x 3 (music: happy, sad, no-music (control)) between-subjects ANOVA on the dependent variable of average rating on the categorical facial perception task will be conducted in order to analyze the results of the proposed study. There will be no main effect between the race of the facial continuums and the average rating on the categorical facial perception task. There will be a main effect between type of music and the average rating on the categorical facial perception task. This main effect will confirm hypothesis 2, which states that subjects who listen to happy music during the categorical facial perception task will be influenced to be in a happy mood and will therefore mark the switch from happy to sad faces on the continuum higher than the subjects in the no-music group control group, leaving more happy faces than sad faces perceived on the facial continuum relative to the control group, regardless of the race of the facial continuums. This main effect will also confirm hypothesis 3, which states that subjects who listen to sad music during the categorical facial perception task will be influenced to be in a sad mood and will therefore mark the switch from happy to sad faces on the continuum lower than the subjects in the no-music group, leaving more sad faces than happy faces perceived on the facial continuum relative to the control group, regardless of the race of the facial continuums. *See Figure 2.*

There will be no significant interactions between music and the race utilized in the facial continuums, however the results should demonstrate slightly higher average ratings on the categorical facial perception task for the other-race continuum when the participants listen to happy-music during the facial perception task than on the own-race continuum. Despite the proposed results yielding no significant interactions between music and the race utilized in the facial continuums, the results should demonstrate slightly lower average ratings on the categorical facial perception task for the other-race continuum when the participants listen to sad-music during the facial perception task than on the own-race continuum. This will not confirm or deny hypothesis 1, which states that participants will be more influenced by the music condition when they perceive the other-race facial perception continuum than the own-race facial perception continuum. The results of the proposed study would suggest slight differences that agree with hypothesis 1, but since the predicted results are not statistically significant, hypothesis 1 cannot be confirmed. *See Figure 3.*

Discussion

The results are expected to fit with hypotheses 2 and 3 because they were grounded in previous research literature. Further research is needed to confirm hypothesis 1 because even though the results are expected to agree with this hypothesis, they were not significant enough to confirm the expected results. Similar to Experiment 1, the different emotional types of music presented to each participant induces the anchor effect which establishes a mood congruent to the emotion of the music throughout the duration of the categorical facial perception task. The anchored mood of the participants influenced the way each participant perceived the facial expressions on the continuum. These results were further validated by Experiment 2 because the other-race effect did not impact the influence of music on the participants' facial perception.

Consistent with Experiment 1, the participants who listened to happy music during Experiment 2 should mark the switch from happy to sad faces on the facial continuum higher, leaving more happy faces than sad faces relative to the control group. The results of Experiment 2 further demonstrate that happy music influences the participants to perceive the more ambiguous facial expressions on the facial continuum as happy faces more often than sad faces. Furthermore, the participants who listened to sad music during Experiment 2 should mark the switch from happy to sad faces on the facial continuum lower, leaving more sad faces than happy faces. Once again consistent with experiment 1, the results of Experiment 2 suggest that sad music influences the participants to perceive the more ambiguous facial expressions on the facial continuum as sad faces more often than happy faces. These findings further support the theory that a person's mood can be anchored by music because the results provide evidence that music influences a person's perception of facial expressions.

Previous research conducted on the other-race effect suggests that findings may be limited due to the participants' familiarity bias. In research analyzing the other-race effect, the participant familiarity bias means that a person's past experience and familiarity with the other-race being tested in a study can impact the results (Yankouskaya et al., 2014). Yankouskaya et al., (2014) examine the relationship between the processing of facial identity and emotion in own-race and other-race faces. The researchers explained that their results varied for the other-race faces condition due to the amount of social contact the participants reported as having had with individuals of the other-race in their everyday lives. Yankouskaya et al., (2014) present evidence that could be a limitation of the proposed study. In Experiment 2 of the proposed study, the researcher does not include a measure of experience to other-race faces. Given that experience with other-race faces can influence a person's perception of other-race facial

expressions, the results could be significantly affected by each participant's individual familiarity with other-race faces. Future research should include a questionnaire that records each participant experience with other-race faces in order to eliminate this participant familiarity bias. Depending on the participant's familiarity bias, the predicted results of the proposed study could yield alternative results resulting in no main effect between race facial perception and music. *See Figure 4.*

General Discussion

The main purpose of the proposed study is to further investigate the impact music has to not only elicit emotions, but to also influence the way a person perceives facial expressions. Aside from facial perception, the proposed study demonstrates just one scenario where music has an impact on a specific task. A vast amount of research has been conducted analyzing the influence that music has in advertisements to affect consumer behavior and specifically consumer purchase intentions. Alpert et al., (2005) investigated the impact music has to induce emotions that increase a person's likelihood of purchasing an item. Alpert et al., (2005) further investigated previous literature which suggested that background music in commercials can become associated with the advertised product and therefore influence product choice through classical conditioning (Gorn, 1982). Alpert et al., (2005) analyzed the impact of happy music and sad music in two separate commercials by measuring mood, attitude towards the product and purchase intention in their experiment. The results showed the impact music has to induce emotions which increased the subjects' likelihood to purchase the item advertised in the study (Alpert et al., 2005). The findings of this study as well as the predicted results of the proposed study demonstrate just a few examples of how important the emotional impact of music can be.

Further research analyzing the impact music has on influencing facial perception should be conducted to see if the gender of faces displayed in the facial perception continuum influences the results. Although previous research does suggest that there are no gender differences for the participant completing facial perception tasks, there is no evidence to determine whether the gender of the faces shown in the facial continuum impacts the results. Further analysis on this and other variations could prove to be useful not only in the field of advertising, but also could provide explanations for the influences which affect people's facial perceptions in their everyday lives.

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Appendix

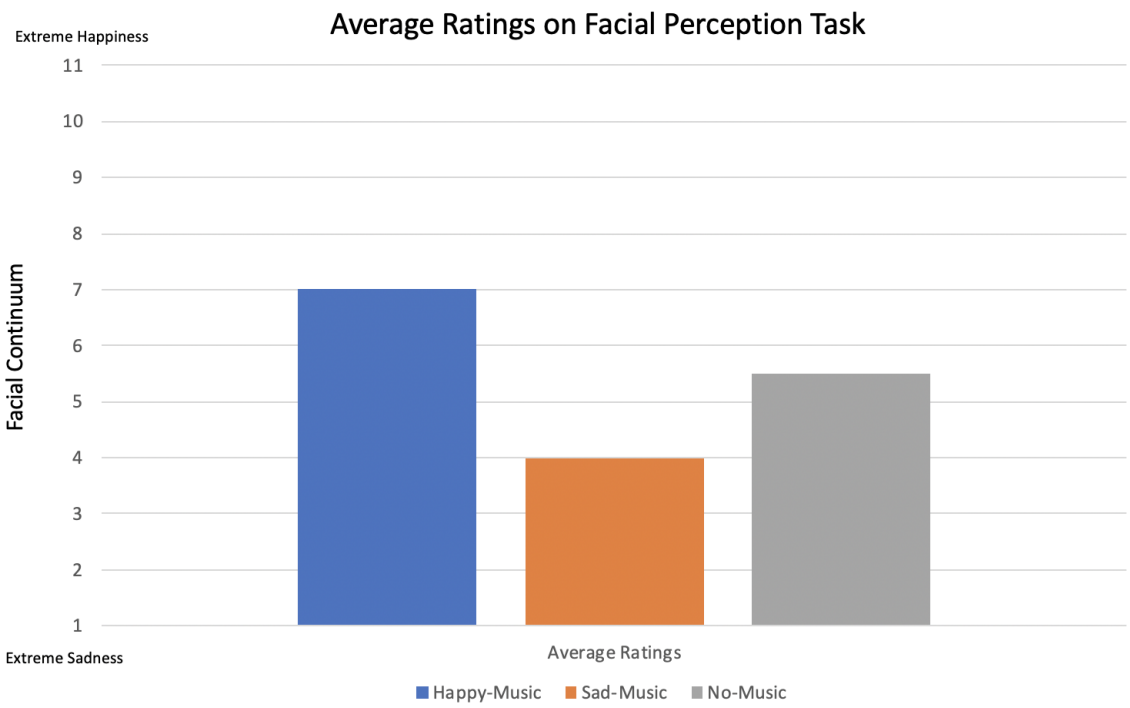

Figure 1. The figure above depicts the predicted results of Experiment 1 of the proposed study in terms of the average ratings on the facial perception task for each experimental group in Experiment 1.

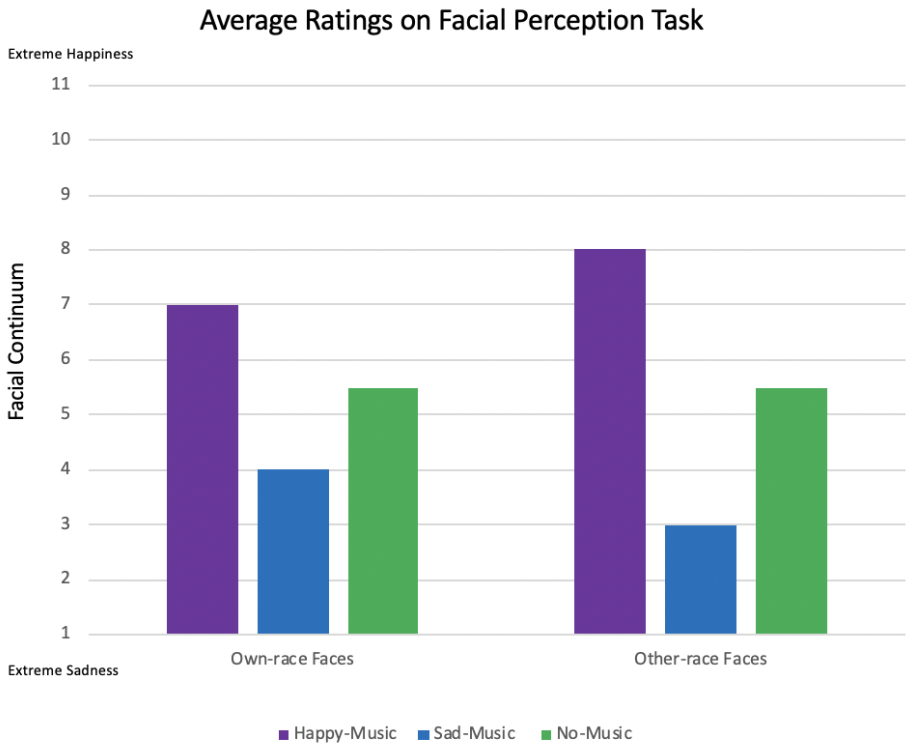

Figure 2. The figure above depicts the predicted results of Experiment 2 of the proposed study in terms of the average ratings on the facial perception task for each experimental group in Experiment 2.

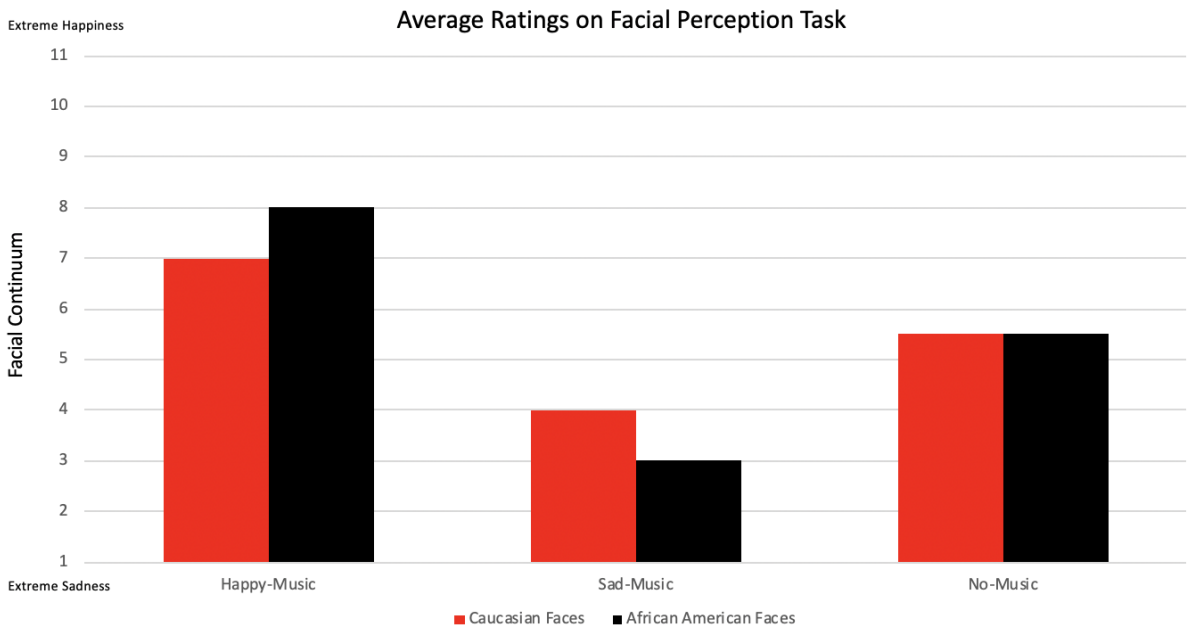

Figure 3. The figure above more clearly depicts the interactions of the predicted results of Experiment 2 of the proposed study in terms of the average ratings on the facial perception task for each experimental group in Experiment 2.

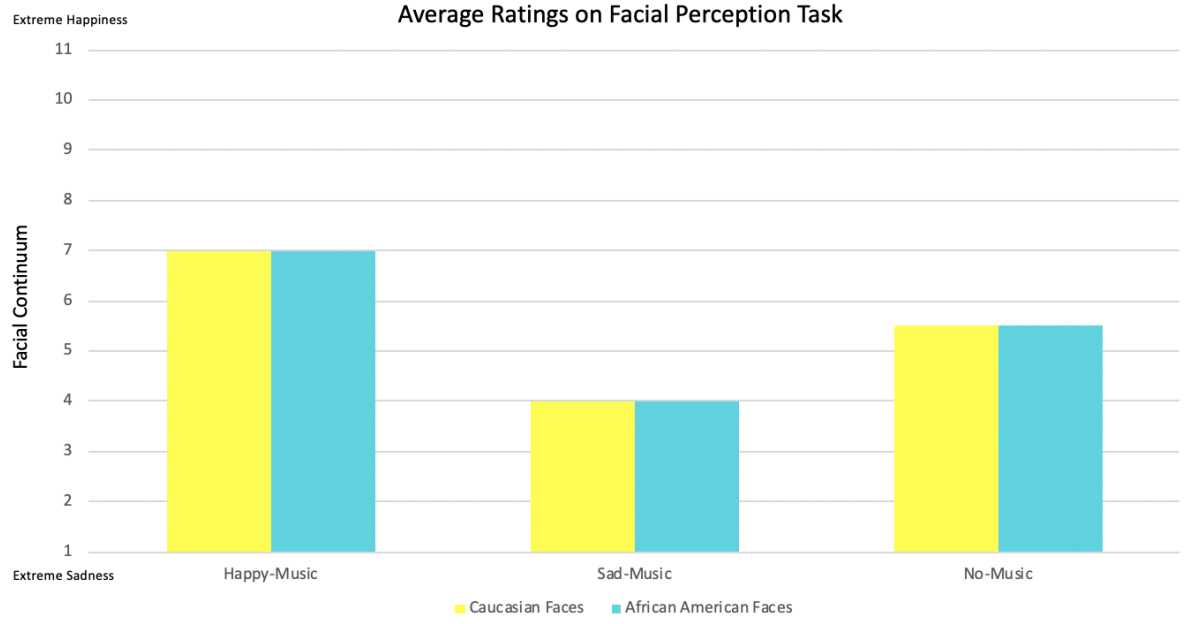

Figure 4. The figure above depicts the alternative results of Experiment 2 of the proposed study in terms of the average ratings on the facial perception tsk for each experimental group in Experiment 2.

TABLE 1. *Description and Pre-test Ratings for "Happiness" and "Sadness" of Music Excerpts Used in the Main Experiment*

Stimulus	Emotion	Composer	Title	Soundtrack	Track	Section (in min)	Duration (in min)	"happiness"	"sadness"
H1	Happiness	Alexandre Desplat	High-Speed French Train	Fantastic Mr. Fox	10	00:00-01:28	02:22[a,b]	2.20 (0.68)	0.45 (0.59)
H2	Happiness	Dario Marianelli	Meryton Townhall	Pride and Prejudice	04	00:00-01:15	02:21[a]	2.65 (0.57)	0.00 (0.00)
H3	Happiness	Niki Reiser	Glücklich	Pünktchen und Anton	02	00:00-01:57	02:27[a,b]	2.00 (0.77)	0.20 (0.40)
H4	Happiness	Ludovic Bource	George Valentin	The Artist	03	00:00-02:36	02:36[b]	2.10 (0.62)	0.10 (0.30)
S1	Sadness	Wojciech Kilar	Twilight Cellos	Portrait of A Lady	04	00:00-02:21	02:21[b]	0.15 (0.36)	2.20 (0.81)
S2	Sadness	Clint Mansell	Together we will live forever	The Fountain	10	00:00-02:30	02:30[b]	0.35 (0.48)	2.25 (0.77)
S3	Sadness	Javier Navarrete	Pan's Labyrinth Lullaby	Pan's Labyrinth	21	00:00-01:47	02:24[a]	0.05 (0.22)	2.25 (0.99)
S4	Sadness	Clint Mansell	The Last Man	The Fountain	01	00:00-02:23	02:23[a,b]	0.10 (0.30)	2.65 (0.57)

Note: The superscript "a" means that excerpts were looped to achieve a comparable duration with the other excerpts; the superscript "b" indicates that excerpts were faded out.

Table 1. The table above depicts the 4 happy and sad songs used in both experiment 1 and experiment 2 (Bullock et al., 2018).