Musical versus Visual Cues to Emotion

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Abstract

The purpose of this research was to measure emotional reactions to art and music and determine which one people react to more. I hypothesized that people would react more to music than a visual stimulus based upon previous studies. The same visual stimuli were presented to study participants with different music. Both the visual and musical components were original pieces. Results indicated that individuals reacted differently to the visual stimuli depending on the music being played.

Musical versus Visual Cues to Emotion

I wanted to investigate whether people react more strongly to the effects of visual art or music when viewing and listening to a brief animation sequence. I thought that people would react more to music based upon a class I took two years ago in which my professor talked about YouTube videos in which people would change the soundtracks to popular movies. In the examples that he showed us, a serious scene could become romantic or comedic and vice versa. I wanted to expand on that idea and see which element, musical or visual, would impact people more.

Various types of research have been done on the differential impacts of music and art. One study showed that when people had to deal with pain, they found it was easier to handle with music rather than art or nothing (Mitchell, MacDonald, & Knussen, 2008). The participants were put into three groups: one with the participants' choice of one out of fifteen artworks, one with preferred music and one with silence (Mitchell, MacDonald, & Knussen, 2008). The participants went through a process and tested their tolerance, pain intensity, perceived control, and anxiety, along with a music listening patterns questionnaire (Mitchell, MacDonald, & Knussen, 2008). The results indicated that the participants with the preferred music had higher levels of tolerance, less anxiety and more perceived control than those who had the visual distraction or nothing at all (Mitchell, MacDonald, & Knussen, 2008). On the other hand, repetition of music found in everyday life affected anxiety in a negative way, but knowing the lyrics increased tolerance and perceived control further (Mitchell, MacDonald, & Knussen, 2008).

There are also multiple studies that go to the core idea of using music to evoke emotion. These studies agree that music can cause an emotional reaction in a person (Baumgartner, 2005; Patrik, 2001). Baumgartner's results also supported the idea that art could induce emotion as well, but not as much as music. These findings support the idea that art and music, but particularly music, can have a strong emotional impact on a person. Results indicated that it is strong enough to reduce a person's pain or perception of pain, and increase or decrease one's anxiety, in addition to evoking a certain emotion from a person.

A different study discussed the emotional impact of music on younger people and older people (Pearce, 2015). Using the Geneva Emotional Music Scale 9, they tested participants to see how film music would affect them (Pearce, 2015). While both groups, younger and older, liked the music and reacted to it in similar ways, the younger people found sad music to be more sad happy music to be more happy as per compared to the older group (Pearce, 2015). Since my study was done with college students, this study may pertain to mine as all of my participants are young. Perhaps the results of my study would have been different with a more diverse group of participants.

There was another study that was very similar to mine that determined "the effect of auditory (happy and sad instrumental music) and visual stimuli (happy and sad faces) congruent or incongruent for emotional content on audiovisual processing using fMRI blood oxygenation level-dependent (BOLD) signal contrast" (Jeong et al., 2011, "Method," para. 1). They were able to find different reactions in the brain based upon the pairing that they did, such as there was more "activation" in the "superior temporal gyrus" for happy music and happy faces over sad music and sad faces (Jeong et al.,

2011). Additionally, participants found the happy faces to be less happy when sad music was paired with it and sad faces were less sad when happy music was paired with it (Jeong et al., 2011). While I did not test how emotional participants were, seeing other similar studies further supports my hypothesis.

An article that reviews other studies also mentioned other studies that may relate to mine. In those studies, they tested the visual perception of one's environment based on emotion (Zadra & Clore, 2011). In this article, they state that emotion can impact one's visual perception as well as other stimuli (Zadra & Clore, 2011). The article discussed how a negative emotion can often affect one's perception. For example, one study tested the idea that when one sees a fearful face rather than a neutral face, participants were able to see contrasts better (Zadra & Clore, 2011). Other studies were along the same lines in which perception and attention were tested via all manners of visual stimuli, such as visual illusions, in order to see how mood affects it. Even small things such as how steep a hill seems can be impacted by one's emotions (Zadra & Clore, 2011). One way in which researchers affected mood was by playing sad or happy music while doing the different experiments (Zadra & Clore, 2011). This specifically relates to the study I did as when music is played, it can affect one's emotions and therefore their perception on what is in front of them. If music can affect how steep someone perceives a hill to be, then it should impact the way that they view other things, such as a video. The difference with the study I did was that the video was attempting to portray another emotion at times, which would produce different results than if we were simply looking at only human perception of their environment.

Furthermore, a previous study indicated that people were likely to listen more closely to music when they were engaged with art in the form of paintings than when listening to music alone (Shank, 2003). This study was done on pre-service elementary teachers from a southern university, who are likely close in age as those found within my study (Shank, 2003). The students were separated randomly into two groups: a control group and the tested group (Shank, 2003). Both groups were non-musicians who were being taught music lessons over the span of two weeks with one group being show projected paintings (Shank, 2003). They were given a test before the lessons and after to see what these non-musicians learned and retained (Shank, 2003). “Results indicate that the group receiving visual stimuli in the form of paintings scored significantly higher on listening skills ($p<.01$) than the control group which received no visual stimuli ” (Shank, 2003, p.58). A similar study was done in which they found that music when paired with art created more activation in the brain (Baumgartner, 2006). It is apparent that the arts correlate with each other as they often pair up or overlap, such as musicals where theatre and music mix or sound art where visual art and music merge. However, these studies support that idea and expand on it to include that a visual stimuli may improve the skills people use to listen to music.

Method

Participants

The goal was was to include 60 participants, with 15 viewing each set of stimuli. The participants were students from the campus of Ramapo College. There was a diversity of participants by age and gender, but the age likely ranged from 18-24. The

participants were not paid, but some gained credit from their teacher for a specific class, *Introduction to Psychology*. Those participants fulfilled part of their research requirement by earning .5 credits. In addition, some professors gave extra credit for participating in studies, which is how some other students may have gained extra credit, at their professor's discretion.

Materials and Procedure

Participants were asked to come to a room equipped with a computer projection and speaker set-up on campus. I presented each participant with a consent statement (please see Appendix A). When the participant signed the consent form, agreeing to be in the study, he or she was then presented with a written survey (please see Appendix B), after watching a piece of animation with music (the stimulus). The study was done with groups of participants; group size varied based on participants' availability.

There were four different possible stimuli for the participants: "happy" animation with "happy" music, "happy" animation with "sad/scary" music, "scary" animation with "happy" music or "scary" animation with "sad/scary" music. The animations did not correlate to each other in any way and all four of the soundtracks were different. All of the art and music was original work created by me. Participant groups were randomly assigned to a set of two animation/music combinations.

One of the four stimuli was presented face-to-face to a group of participants at random. It took place in a classroom with a projector connected to a desktop and surround sound system. They were then asked to circle the emotion that the video most closely evoked for them from a list on a paper that was handed out after the video played (Appendix B). The list of emotions were: Anger, Sadness, Happiness, Fear, or Disgust.

They then saw a second animation (different from first) with different music and were asked again to pick the emotion evoked. No participant saw the “happy” animation or the “sad/scary” animation twice.

All participants were debriefed at the end of the study and I answered any questions that they had.

Development of Animations and Composition of Music

There were two animations that I created, one that was “happy” and one that was “scary.” One was a stop motion animation composed of an abundant amount of pictures strung together through the program Final Cut Pro. The other was made using Cinema 4D to show the planets revolving around the sun and gradually dying. Two possible soundtracks accompanied each animation. Each animation had one song that was “happy” and one song that was “sad/scary”. There were 4 soundtracks in total, as the 2 “happy” and the 2 “sad/scary” soundtracks were different from each other. The soundtracks were created on the software program Logic. These animations and soundtracks were viewed and listened to by others who assisted with the project before the study was conducted to ensure that they evoke the correct emotion. While the music evoked the correct emotion with everyone who was asked to review it, the “happy” animation was criticized as being “too quirky” at one point by one person.

For the “happy” stop motion animation, I asked my friend Samantha Risman to be my model. She is a typically energetic person and she was excited and willing to be a part of the project. At first, I did not initially have a plan for what the photos would consist of, but I found some props in the room that we were working in, a water dispenser and a cup, and they became the inspiration for the video. They would just appear on a table next to

my friend and she would react to it in a funny way. I wanted the video to have a clear beginning and end as well, so I asked her to start by waking up and end with going through a door at the end that would remove her from the situation. While in theory, the concept sounded simple, it ended up being confusing to some, as it did not have a clear plot. My goal was for it to be "happy," but some people that were part of the study found it weird and confusing because there was no story line to follow and my friend's reactions weren't funny to everyone. This confusion may have affected the results for the trials that used the "happy" animation.

When first creating the "sad/scary" animation, I wanted it to relate to most people. Therefore, I thought that a common sadness or fear that most people face is the future. The common future that will scientifically inevitable happen is that the universe will in some way as we know it be destroyed, even if that does not happen for millions of years. I created an animation with that theme in mind. I wanted to gradually get into that idea though, so I started off simply by having the planets move around the sun in a typical orbit. About halfway through, the planets began to explode and dissolve and at the end, the sun imploded on itself. I created the planets myself by using Photoshop and they appeared somewhat realistic. I knew that with the type of video I wanted to show, it would not be taken seriously if it was too cartoonish or unrealistic. I edited all of the planets to reflect their actual size and speed of orbit and rotation. I researched how each planet moves around the sun and on its axis as well as in which direction. All of these additional details added to the realism of the piece; even if the participants didn't know the exact size of all of the planets, they likely know a few facts and I wanted to keep in line with the real science as much as I could. The sun was made in Cinema 4D by

layering multiple lights that was also realistic enough; however, as it was not a solid object, one could see the planets through it if the planets were behind the sun opposite of the "camera." That limited the angles that I was able to choose from at certain points while creating the animation, but I had no complaints that would lead me to believe that it affected the final product in anyway.

The four soundtracks were all created on a program called Logic with music theory and what I have learned in my classes in the back of my mind. While I wanted two soundtracks to be "sad" and two to be "happy," there are different types of sad and happy. Therefore, I watched each video a few times, noted how long it was and decided what exact emotion would pair best with the video. For the happy video, I decided that it reminded me a bit of a child, as my friend's reactions were playful and exaggerated. I worked on the "happy" soundtrack with that in mind and created what I believed to be a playful track. I split up the video into certain parts in which my friend, Sam, is doing the same thing for a short amount of time. For example, she was waking up in the video for some time, and then she was reacting to the appearance of the cup, etc. At each point that I split up the video, I would change the music slightly to a different pattern. I also added some more playfulness with a gong-like sound happening when something unusual happened, such as the appearances of the cup and water dispenser. My main instruments were flutes and clarinets with some added bass at certain points in the song. Flutes often portray something light and playful, but I needed the clarinets to balance out the sound so there weren't too many higher pitches. The bass added even more lower pitches as too many high pitches can come off as irritating. The entire soundtrack was free rhythm as it was meant to follow the video, not a specific tempo.

The best “sad” emotion that I thought would pair up with the “happy” video was nostalgia. Due to the playfulness and child-like reactions that my friend portrays in the video, nostalgia was the best “sad” emotion to pair up with it, as I knew adults would be watching the video. I started off with a soft piano for when my friend was waking up in the video. I slowly added in a full set of strings that slowly built up a presence within the track. I also made the song slower as slower tracks typically lend to a sadder or more serious sound. This track was also in free rhythm, but held more of a tempo than the “happy” song. The song repeats a large set of chords on the piano a few times with strings often times doubling up on a octave difference of the piano’s chords, which adds an additional tug on the heart and emphasizes those notes. Many of the chords were minor chords, which typically has a “sadder” ring to it.

The sad soundtrack for the sad animation had a similar instrumentation to the sad soundtrack for the happy animation, because I felt that it had worked well with the previous video. However, the sound itself is very different. The soundtrack starts off with singular notes and barely plays any chords. The strings often play a different note than the piano, which provides dissonance. This effect evokes a more anxious sound rather than being sad. The tempo is also slow for this soundtrack. The sound was meant to be fearful and somewhat serious in order to pair up with the solemn theme of the video.

The happy soundtrack for the sad animation was a little bit trickier for me. I had difficulties in figuring out which type of happy would play off well with my sad animation. I ended up going for a space-feel, which mainly includes multiple synthesizers. The electronic feeling of the synthesizers is often a sound that can be heard with movies dealing with space or the future. The basic sequences that I looped were not

enough to provide a happy sound though; for that, I needed a faster tempo track with many major keys in it. Some of those that were verifying that the music supplied the correct emotion pointed out the track and said that if it hadn't been in there, they would not have gotten the happy feeling as the rest of it was more calming than anything else. With the added peppy synth though, people said that they thought it evoked happiness.

Issues with the Study

The study took place over two different dates with the four different stimuli being tested each day. The plan was for participants to come to a room equipped with a computer projection and speaker set-up on campus. For the first date, the projector was set up as expected, but the computer did not have the program QuickTime, which is the program that was supposed to be used to present the videos. The only version of the video that I had at the time was off of my email, but the soundtracks were not attached. Therefore, for the first date of the study, the video had to be played separately from the soundtrack. This could have tipped off some participants as to what the study was about, which may have affected how much they pay attention to the soundtrack, which may have impacted the emotion they chose. In addition the sad video on my email was titled "sad," which may also have affected participants' decision on what emotion to circle as well. Since the soundtrack had to be played separately from the video, the sound was not exactly where it was supposed to originally be in regards to the video. For example, a specific ringing sound would be about a second early when one is watching the video. I am unaware as to whether that affected participants or not, but it is a notable point. For the first stimuli on the first date, there were some technical difficulties, which resulted in some delays as well. While the participants were kind about it and we ended on time, the

delay may have irritated some of them or made them anxious, which could have affected how they feelt going into the study and what emotion they ended up choosing. Even after the technical difficulties were fixed, one should take into account that the original emotion that they had been feeling throughout the day could have affected how they felt while watching the video. If someone was having a bad day and feeling sad or angry, then saw my videos, their negative feelings may have stayed with them and affected the way they saw the video. During the fourth stimuli on the first date, one girl's phone went off and one boy was asking questions and making commentary throughout the videos, which may have affected how much they listened to the soundtrack, potentially not affecting the emotion they felt in the way it was intended.

On the second date, since my advisor and I were now aware of the lack of QuickTime on the projector, I brought my own laptop and set it up there. The maximum amount of people per stimuli that day was eight, so there was not a problem as to whether people could see the screen or not. I did also double check that everyone could see the screen by asking and I put it at the loudest volume before presenting the video. The participants were sitting around a rectangular table while I was sitting at one end of the table with the laptop. Though it was not initially how we were hoping to present the videos, it worked out nonetheless. On this date, all of the participants watched the videos played correctly with the different soundtracks, even though it was off of a smaller screen than desired. In the middle of one of the stimuli, while the first video was playing, a girl who was late came in and I asked if she could give us a minute. I then asked her to come in before the second video began. I asked her to sign the consent form and then I played the second video of the stimuli. Once all of the other participants for that stimulus left, I

played the other video for her. She was the only one to have the videos played in that order and while I do not believe it would have any affect on her emotions, I thought that the discrepancy should be noted. Another girl that participated that day knew the friend that I had used as my model for the happy stop motion animation. No one else mentioned knowing her, but that may have also had an affect on the one girl's emotions depending on how she feels about my friend.

The study ended up having 37 participants with 4 males and 33 females. Participants were mainly students who needed to get credit for participating in studies, which is a requirement for students in the *Introduction to Psychology* classes. All participants were over the age of 18, were students at Ramapo College of New Jersey and were young adults. The four stimuli that were available were randomly assigned to one of the four groups that were doing the study for the two available dates. Each stimulus was done once on each date.

Results

When the song and animation were both created to be "happy" stimuli, participants were equally likely to experience anger, happiness, and disgust, χ^2 (2, N = 24) = .88, p = .64. It appears that there were individual differences in how this animation and music combination impacted people.

When the song was "happy" but the animation was more solemn, participants were equally likely to experience sadness, happiness, and fear, χ^2 (2, N = 22) = 2.58, p = .28. Once again, the animation and music combination struck people differently; even though the modal response (N = 11) was to say "happiness," consistent with the music, there were 11 other participants experienced a negative emotion.

For the sad song and happy animation combination, the most common emotion experienced was disgust, rather than sadness or happiness, albeit not significantly so, χ^2 (3, N = 12) = 4.67, p = .20. Perhaps the perceived mismatch between the visual and musical cues created a feeling of discomfort. Combining the negative emotions, 11 participants experienced something negative and only 1 experienced happiness, $\chi 2$ (1, N = 12) = 6.76, p = .01, a significant effect. In this case, the music appeared to have more impact than the animation.

Finally, for the sad song with solemn animation, most participants experienced sadness, χ^2 (3, N = 15) = 11.40, p = .01, as was expected. See Table 1.

Table 1.
Frequencies of Emotions Expressed by Animation and Music Type

	Type of Animation			
	Happy		Sad	
	Happy Music	Sad Music	Happy Music	Sad Music
Emotions				
Anger	8	0	0	1
Sadness	1	3	5	9
Happiness	10	1	11	4
Fear	0	2	6	1
Disgust	6	6	0	0

Discussion

When there was a different impact between music and visual, music had more impact as I hypothesized. However, that was true for only one of the mismatch combinations. For the happy music, solemn visual there was no dominant effect of music. There was, though, a difference in reaction when one contrasts the happy

animation, happy music to happy animation, sad music. They do not have the same reactions, so the music did make a difference. The same is true for the sad animation; the music made a difference there as well, although not statistically strong.

Given these results, it is possible that the animations simply did not appear happy or sad to all the participants as they were meant to be, regardless of the music. This can especially be seen with the happy animation, as even with the happy music, there was not a majority of participants that found it to be happy. In fact, one person went into a bit of detail when explaining his decision to mark "disgust" and he referenced certain actions that the girl did in the happy animation, such as pour water on the floor, touch it and inspect it. Others simply said that they felt confused by the mismatched combinations.

When considering the sad animation, more people checked off that they were happy with the happy soundtrack than those with the sad soundtrack. Even though happiness was not the majority for the sad animation, happy soundtrack, a larger number of participants circled happy. This supports the idea that music can affect a visual stimulus, even if it did not pertain to everyone. Everyone is different and likely not to react to the same stimuli in the same way.

Significance

This study tested to see if people would be affected by a musical element with a visual stimulus. Specifically, I wanted to test which form of art is stronger. While it likely depends on the individual, some people seemed to be subtly impacted by the music. The study supported the idea that the soundtrack can impact what the person feels, which can and is likely used for real world applications. For example, all movies have soundtracks that are likely trying to get their audience to feel a certain way. If the main character in a

movie is feeling anxious, the soundtrack might reflect that and attempt for the audience to feel the same way. They may add a gradually rising heartbeat, or some dissonant tones. It also demonstrates how much the arts can impact our emotions. People can binge watch television shows, because the story might be relatable or interesting or dramatic; they want to see it. People have favorite songs, artists, and actors because we are likely all impacted by the arts and what they can make us feel.

Future

If this study were to be redone, it would be very beneficial to create materials that everyone agrees is happy or sad as intended. While others checked my materials before the study, I would suggest using a larger pretest group to determine whether the materials support the emotion they are expected to evoke. Additionally, the technical difficulties were not part of the plan, but checking the computer's programs beforehand would have been in my best interest. While this project was intended for my honors thesis project and was therefore held on the campus of Ramapo College of New Jersey, some diversity in gender and age would produce much better, more reliable results. Although similar studies have been done in the past, the idea of visual versus musical is still a rather new topic and one that is difficult to test psychologically as everyone's opinions and likes are different. I hope that as more research comes out, we will begin to see the true effects of the arts on people's lives.

Appendix A

Consent Statement

Thank you for volunteering for this study. Today you will be viewing two short videos with accompanying audio. After each video, you will be asked to pick the emotion that

was evoked from a list. The entire study will be completed in approximately 5-10 minutes. There are no risks in participating, but you can stop at any time if desired, without any penalty. All responses will be kept confidential. Some students (including Introduction to Psychology students) may get class research credit for participating. If not, the only benefit will be an interesting experience.

Ariana Rivera is doing the research for an honors project and you may contact her via email at arivera7@ramapo.edu with any questions. You may also contact the faculty advisor, Donna Crawley, at dcrawley@ramapo.edu. This research has been approved by the Ramapo College IRB (approval # ____),
Dr. Jacqueline Braun, chair (jbraun@ramapo.edu). You must be at least 18 years of age to participate.

Please sign below giving your consent to participate in this study. Thank you for your time.

Signature: _____ Date: _____

Print your name: _____

Appendix B

Survey

Video 1

Please indicate the emotion that you experienced the most as you watched the first video sequence.

Please circle the word below that best describes your emotional reaction to this video**.**

Anger **Sadness** **Happiness** **Fear** **Disgust**

Video 2

Please indicate the emotion that you experienced the most as you watched the first video sequence.

Please circle the word below that best describes your emotional reaction to this video**.**

Anger **Sadness** **Happiness** **Fear** **Disgust**

References

Baumgartner, T., Esslen, M., & Jäncke, L. (2005). From emotion perception to emotion experience: Emotions evoked by pictures and classical music. *International Journal of Psychophysiology, 60*, 34-433.

Baumgartner, T., Lutz, K., Schmidt, C.F., & Jäncke, L. (2006). The emotional power of music: How music enhances the feeling of affective pictures. *Brain Research, 1075*, 151-164.

Jeong, J.W., Diwadkar, V.A., Chugani, C.D., Sinsoongsud P., Muzik, O., Behen, M.E., Chugani, H.T., & Chugani, D.C. (2011). Congruence of happy and sad emotion in music and faces modifies cortical audiovisual activation. *NeuroImage, 54*(4), 2973-2982. Retrieved from www.sciencedirect.com/science/article/pii/S1053811910014473.

Mitchell, L. A., MacDonald, R. A. R., & Knussen, C. (2008). An investigation of the effects of music and art on pain perception. *Psychology of Aesthetics, Creativity, and the Arts, 2*(3), 162-170. http://dx.doi.org/10.1037/1931-3896.2.3.162

Patrik, N. J. & Sloboda, J. A. (Eds.) (2001). *Music and Emotion: Theory and Research.* Oxford, U.K.: Oxford University Press.

Pearce, M. T. & Halpern, A. (2015). Age-related patterns in emotions evoked by music. *Psychology of Aesthetics, Creativity, and the Arts, 9* (3), 248-253.

Shank, J. S. (2003). *The effect of visual art on music listening.* University of Kentucky Doctoral Dissertations, 397. Retrieved from https://uknowledge.uky.edu/gradschool_diss/397

Zadra, J.R., & Clore, G.L. (2011). Emotion and perception: The role of affective

information. *Cognitive Science*, *2*, 676-685.