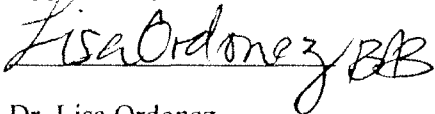


“What a Feeling: The Impact of Music on Emotions”

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Abstract

My research focuses on the role of music in emotion induction. Emotion induction is widely used in Judgment and Decision Making tasks to determine how individuals make their decisions. Although there are several different methods of emotion induction, I chose to focus on what kind of effect music has on emotion induction. I did so by first checking whether or not the songs I picked brought about the emotion I was intending, and then by using a combined effect of music and a writing task to determine how well the simultaneous effect of both induced the emotions better. I then go on to compare gender differences in music associated arousal of emotions, and also whether or not prior musical experience has any effect of emotional arousal as well.

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Introduction

The role of emotion in judgment and decision making (JDM) has been a topic of increased interest in the past decades. By inducing different kinds of emotions (sadness, happiness, fear, neutrality, etc...), experiments are conducted to test whether feeling a certain way has any influence on the way you make a decision. For example: if you are feeling especially happy, are you willing to take greater risks when making decisions? Or would you rather stay safe due to feelings of happiness and content and risk less? One study found that happy individuals are more trusting of others, and willing to participate in risky behavior (Slovic, Peters, 2006). In another study done by Kugler, Connolly, and Ordonez from the University of Arizona, results show that the emotion of fear causes more risk-aversity than anger, when it comes to randomized risk taking events (such as a lottery). However, in risk-taking tasks where uncertainty was generated by another person, fearful participants were more risk-taking than angry ones (Kugler, Connolly, Ordonez, 2010). Because decisions are such an integral part of our everyday lives, it is important to test how different emotions can be induced to test their effect on decision making.

There have been numerous studies done based on how humans process information and ultimately make their decisions. In one study, researchers describe that “emotions are not taken into account enough when studying how individuals make their decisions” (Holt, Laury, 2002). A study, done at the University of Iowa, suggests that, “The influence of emotions on decision-making is largely ignored. The studies of decision-making in neurological patients who can no longer process emotional information normally suggest that people make judgments not only by

evaluating the consequences and their probability of occurring, but also and even sometimes primarily at a gut or emotional level” (Capra,2004). In another study, researchers describe what is known as the somatic-marker hypothesis, “This theory holds that such decisions are aided by emotions, in the form of bodily states, that are elicited during the deliberation of future consequences and that mark different options for behavior as being advantageous or disadvantageous. This process involves an interplay between neural systems that elicit emotional/bodily states and neural systems that map these emotional/bodily states” (Lerner, Keltner, 2001).

There are several different ways to induce emotions. In Dr. Lisa Ordonez’s lab in the past, we have used mostly writing tasks. These tasks ask participants to reflect upon a time when they have felt most happy, sad, or scared, and are then asked to write a detailed 1-2 page description of this time. To test whether or not that certain emotion was induced, we then give participants a PANAS, which stands for “positive and negative affect schedule” (PANAS; Watson and Clark, 1994). This PANAS asks the subjects to rate their intensity of feeling a certain emotion on a scale of 0-9. There are approximately 22 different emotions on this PANAS. We compare this PANAS that they take after the independent variable to one they take before, to test if there are any significant differences between how they are feeling after being given the independent variable. We then collect the data and run it through a computer program, known as SPSS, to quantify how well the certain emotion was induced.

Other ways of inducing emotions also include using film clips, vignettes (short writing pieces infused with a certain emotion in hopes of inducing it), music, and even disguised actors acting out a scene with unknowing participants in order to make them feel a certain emotion. The latter are known as confederates. So far, we have used writing tasks, vignettes, and film clips to

induce emotions. Out of these, we have found that writing tasks have been the most effective in inducing emotions. In my study, I test to see what kind of effect music has on emotions, and then see what the combined effect of music and a writing task look like on students' emotions. There has already been research done that shows the power of the effects of music on emotions. In one study done by Klaus Scherer, it was found that music is one of the most effective triggers of strong emotional experiences (Scherer, 2004).

Although inducing emotions may seem simple enough and not as important as the decision making, it is imperative for not only our study, but any other study involving emotions, to try and produce the greatest effect of this emotion as possible.

Pretest

Methods:

We recruit subjects for our experiments through the Eller listserv. These students are all University of Arizona undergraduates who have added their name to this listserv. Often times they get paid for the experiments they do, or they may receive extra credit for a class. Experiments are run in sessions due to the limited availability of space. It is important that each subject be given their own room, so we utilize the DBL (Decision Behavioral Laboratory) in McClelland, which allows 10 subjects to be ran per session, and each subject is given their own soundproof room.

The procedures for these experiments were fairly simple. I brought in subjects into the DBL, had them sign their names in, and took them each to a separate room and closed the door. For my initial studies, I ran my experiment in 3 sessions, with 25 participants. Each room contained an envelope which contained the materials for the experiment, a computer, and a

pencil and pen. First, subjects needed to read through a consent form, which explained to them that they would not be harmed or cheated in any way, and all their answers would be anonymous. For the first part of my study, I wanted to simply test whether hearing a certain song brought about feelings of a certain emotion. To begin, I had subject's first fill out a neutral writing task, explaining their usual daily morning routine. At the end of the writing task, subjects filled out a PANAS. This PANAS was later used as a means of comparison: to see how their emotions changed from the original neutral PANAS, to the ones they took after listening to each song.

The next steps the students completed, were listening to a song for approximately 2 minutes, and then completing a PANAS while the song still played, in order to determine how each song made them feel. Rather than hearing the song out of the computer's speakers, however, I had students put on headphones. I believed a headphone experience would provide a surround-sound, more intimate feel rather than speakers. The PANAS students filled out after listening to the songs, differed slightly from the one they filled out to get their neutral reading. In these, I also added 2 preliminary questions: "How much do you like this song", and "How familiar are you with this song?" Each question had a scale 1-7 (1= not at all, 7= very much). For my experiment, I chose to induce Sadness, Fear, and Happiness. These emotions were ones I had previously worked with in Emotion Induction, and emotions that I felt had a strong presence in many songs. For the songs, I chose Beethoven's Moonlight Sonata for Fear, Clint Mansell's Requiem for a Dream for Fear, and then again, Beethoven's Fur Elise for Happiness. Students first listened to Moonlight Sonata for 2 minutes, and then filled out a PANAS while the song still played, and then did the same for Requiem for a Dream, and then Fur Elise. After completing this part of the task, students then filled out a demographic sheet which asked them for their age,

race, class standing, ethnicity, gender, whether they liked classical music, and whether they had played an instrument growing up (which one?). The demographic sheet marked the end of the experiment. If at any point in time subjects had any questions, I was available in the front of the room to help. I conducted this first part in order to determine whether the songs I had chosen did in fact produce the kinds of emotions I was looking to induce in the subjects.

Results:

To analyze the data, we would utilize a statistical analyzing program known as SPSS-Statistical Package for the Social Sciences. After all the sessions were ran, we created an excel sheet and inputted all the data from both the before and after PANAS and demographic sheet. We kept track of which PANAS corresponded with which emotion.

These were the results, after performing a paired t-test on each separate emotion, conducted at an alpha level of .01.

	MEAN BEFORE	MEAN AFER	P- VALUE	SIGNIFICANT?
MEASURED EMOTION: SADNESS	2.35	5.28	<.01	YES
MEASURED EMOTION: FEAR	1.85	4.43	<.01	YES
MEASURED EMOTION: HAPPINESS	5.16	5.85	<.01	YES

As the chart shows, there was indeed a significant difference in the means before and after the subjects listened to the songs, indicating that the songs picked did produce feelings of that certain emotion. As seen in the chart, the before and after mean for Happiness, although still significant, was the least changed. From conducting such experiments in the past as well, we have noted that this is because college students are almost always happy. Their levels of happiness in all before means were significantly high, and it's hard to produce as strong of an increase in their happiness.

Experiment

Methods:

This experiment was to determine how well a combined factor of listening to a song and completing a writing task for a given emotion would induce that certain emotion. For this portion, I initially wanted to use 20 students for each emotion (60 in all). However, because not all students show up, I used 17 students for Fear, 13 for Sadness and 14 for Happiness. Similar to the previous experiment, each student had their own room after signing in their names. Once in the room, the students took an initial PANAS to determine their base emotions. After having completed that, the students listened to one of the three songs for one minute on their headphones. Next, while still listening to the song, the students filled out another writing task that corresponded to the emotion they were feeling. If they were listening to Moonlight Sonata, they filled out the Sadness writing task, etc... At the end of the writing task, the students then filled out another PANAS (while still listening to the music) to determine how they were feeling after completing the independent variable. Finally, the same Demographics page was given to the students, and they were then free to leave.

Results:

For the second part of my experiment, I was to see what kind of effect the combined writing task and music clip had on students. These were the results of a paired t-test, conducted at an alpha level of .01.

	MEAN BEFORE	MEAN AFER	P- VALUE	SIGNIFICANT?
MEASURED EMOTION SADNESS	2.94	5.46	<.01	YES
MEASURED EMOTION FEAR	2.54	4.11	<.01	YES
MEASURED EMOTION HAPPINESS	5.19	6.93	<.01	YES

Again, these numbers do in fact indicate that the students were significantly impacted by the combination of writing tasks and music clips to induce a given emotion.

The next result I wanted to quantify were the differences between the measured emotions for each given song. The first chart indicates the *after* means for each song and emotion, and the second chart indicates the p-level for each combination of song and emotion, and whether or not it is significant.

	Measured Emotion Happiness	Measured Emotion Fear	Measured Emotion Sadness
Emotion Song: Happiness	<u>6.9</u>	3.3	4.1
Emotional Song: Fear	2.1	<u>4.1</u>	2.9
Emotional Song: Sadness	1.5	3.2	<u>5.5</u>

In this first chart, the Measured Emotion is on the top (columns), and the Emotional Song is on the side (rows). As it should be, the Happiness Measured Emotion and Emotional Song, the Fear Measured Emotion and Emotional Song, and the Sadness Measured Emotion and Emotional Song all have the highest means. This simply says that for the given Emotional Song we picked, the highest felt emotion out of the three emotions studied, was the one that corresponded with the emotion of the song. It also shows how scared and sad those who listened to the Happy song felt, how sad and happy those who listened to the Fear song felt, and how happy and scared those who listened to the Sad song felt.

Other analyses that I ran out of curiosity, were the relationships between gender and music, and prior musical experience and music.

	Male Before	Male After	Male p- value	<i>Female</i> <i>Before</i>	<i>Female</i> <i>After</i>	<i>Female p- value</i>
Fear	2.27	3.44	.13	2.69	4.48	.007
Sadness	3.33	5.96	0.01	2.08	4.33	0.23
Happiness	5.22	6.45	0.02	5.13	7.73	0.03

In the gender differences table, it can be seen that for Fear, there is only a significant difference in means for females. However, for Sadness only males had a significant difference in means, and for Happiness both males and females had significant differences in in their before and after means. Based on these results, it is difficult to say whether males or females are more affected by the songs.

	Musical Experience Before	Musical Experience After	No Music Experience Before	No Music Experience After	Musical Experience p-value	No Musical Experience p-value
Fear	3.2	4.2	2.2	4.0	.038	.001
Sadness	2.0	6.3	3.5	4.9	.05	.0006
Happiness	4.9	7.4	5.4	6.3	0.003	0.15

My original prediction was that those who have prior musical experience would be affected by emotional songs, more than those who do not. However, this does not necessarily seem to be the case. All of the differences in means are significant, except for the difference between before and after Happiness for those who did not have musical experience. However, the p-value is higher for those who do not have musical experience in both other cases (Sadness and Fear), than those who did have musical experience.

Discussion

The role of inducing emotions is a very important one in Judgment and Decision Making. Because emotions are often very fleeting, but very crucial to the Judgment and Decision Making process, it is imperative that we find induction methods that are most effective. Otherwise, not only may we lose significant amounts of money conducting faulty experiments, but the conclusions we may draw from such experiments could be misleading. Music is widely known to penetrate deep into our emotional senses, and hold great emotional value. Whether it be sadness, happiness, fear, or any other feeling, it is clear that certain harmonies, chords, lyrics, beats, and instruments bring about a certain feeling. According to research done at the University of Cincinnati, it has been shown that modulation of the keys away from their major chords creates anxiety, and the return of the keys to the major chord provides relief. There is also evidence that music arouses emotions and moods in a more direct bodily way as well, influencing the autonomic system and the motor activity of listeners. These different mechanisms of emotional arousal seem to function concurrently and create powerful emotional states (Robinson, 2008).

Because of this, I felt as though using this music in this way would help subjects retain the emotion we are trying to induce. Combined with a writing task for that emotion, where subjects are asked to personalize the story and feel ownership over it, it seems as though the results were significant. In future emotion induction tasks, my results suggest it would be helpful for researchers to use a combined effect of music and writing tasks to induce emotions.

There are certainly improvements that could be made when running our experiments. For one, my study could have certainly be fortified with a great number of participants. With more subjects, the results could be much more trustworthy and less prone to power issues. It would also be interesting to test whether group effects (receiving the independent variable in a group) produce any change in the results. Furthermore, because our experiment is currently only done with undergrad students, it would be important to extend this research to test whether emotions affect other age groups' decision making process as well. The main problem we have been having with undergraduate students is that they are simply too happy- inducing emotions like fear and anger have been especially difficult. Emotion induction has been used in various sorts of experiments, and the importance of them is significant. Thus, it is our hope that we can find the most effective method to produce a lasting and strong feeling of a certain emotion that we may extend to other areas of research as well.

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