The Impact of Music and Mood on Creative Thinking

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ABSTRACT. This study investigated the links among music, mood, and creative thinking. A total of 72 university students watched two video clips to induce certain moods (happy or sad) and then completed a divergent thinking task while listening to happy or sad music. Overall, there were 4 mood and music conditions. Two conditions were congruent (happy/happy or sad/sad), and the other two were incongruent (happy/sad or sad/happy). It was hypothesized that participants in the congruent conditions would show more creativity on the divergent thinking task, and participants in the incongruent conditions would show less creativity on the same task. There was a significant interaction between induced mood and music in the analysis of fluency of responses, $F(1, 64) = 5.15$, $p = .027$, $R^2 = .07$. When in a sad mood, people gave fewer responses if they listened to music that was incongruent with their mood. However, the fluency of responses of the people in the happy mood condition was not significantly affected by mood-music congruency. Overall, the findings implied that congruency affected creative ability especially for those people in a sad mood.

Creativity is an abstract concept that is generally defined as the ability to think unconventionally. The imagination that is often linked to creativity is evident through visual and dramatic art, music, and literature. Despite this common and narrow description, creativity also applies outside of the arts. Divergent thinking is one type of creativity that measures the ability to produce original ideas in response to an open-ended problem (Benedek, Könen, & Neubauer, 2012). There are no right or wrong answers. Beaty and Silvia (2012) described divergent thinking as "broad, diffuse, and bottom-up" (p. 310). In other words, people associate somewhat unrelated concepts and produce creative thoughts. In contrast, convergent thinking focuses on only one correct answer. Because divergent thinking and the broad concept of creativity may be affected by environmental factors, it is crucial to investigate studies that focus on the enhancement or inhibition of creative ability.

One factor that influences creativity is personal mood. Isen, Daubman, and Nowicki (1987) conducted a study in which participants completed tasks involving creative problem solving after a mood manipulation. The researchers found that participants in the positive-affect condition scored higher on the creativity tasks than those in the negative-affect condition. People in a happy or positive mood are more creative because such thinking requires an ability to identify similarities between concepts that seem unrelated (Isen et al., 1987). Similarly, Adaman and Blaney (1995) explored the possible link between mood and divergent thinking. The researchers hypothesized that happy moods would give rise to high scores on a divergent thinking task, but neutral and negative moods would not have a significant effect on the level of creative ability. They used music to manipulate mood to sad, happy, or neutral. Participants then completed the Unusual Uses Task from the Torrance Test of

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Creative Thinking, in which they provided applications for ordinary objects. The findings partially supported the original hypothesis because those in the happy condition scored higher on the creativity task than those in the neutral condition. However, those in the sad condition also scored higher on the task, leading to the conclusion that the heightened emotions of both happiness and sadness stimulated original thought.

One weakness of Adaman and Blaney's (1995) study was that it confounded mood and music. These researchers were interested in inducing certain moods and used music to do so. Because music prompted the mood changes, it is unclear whether the music or the mood was the factor responsible for producing significantly higher creativity scores. Not much research has been done regarding the sole impact of music on creativity, but past studies have examined the *Mozart effect*, the influence of music on general cognitive ability (Jones & Estell, 2007). Although this phenomenon is controversial (Pietschnig, Voracek, & Formann, 2010), the Mozart effect has been connected to enhanced spatial reasoning (Hetland, 2000). Therefore, a potential link could exist between music and creativity. The Mozart effect inspired the creation of the current study, and with this background information and the separation of variables, we should better understand which factor (either music or mood) could potentially affect creative ability.

One explanation for Adaman and Blaney's (1995) findings is that the mood and music interacted. Another study that displays the interaction between mood and music focused on the effects of sad or neutral music on memory and judgment (Vuoskoski & Eerola, 2012). That study found that participants recalled more sad adjectives after listening to self-selected sad music, although this depended on their emotional connection to the music. Furthermore, *affect-congruency* theory states that when people feel a certain emotion, they are more likely to rate stimuli as that same emotion (Hunter, Schellenberg, & Griffith, 2011). For example, when a person is sad, he or she may consider music that is playing to be sad. Music has the ability to induce emotions, especially when the listener is familiar with it.

Overall, Hunter et al. (2011) found an emotional congruency effect in their study of music and mood. After inducing a happy or neutral mood, the researchers had participants listen to either happy or sad music and complete a survey that addressed their reactions. The results showed that people in a sad mood were more responsive to sad music than happy music as indicated in the survey. Similarly, those people in a happy mood responded positively to happy music. The researchers explained their findings through the idea of mood-congruency and the self-explanatory *misery-loves-company* hypothesis (Hunter et al., 2011), showing that the participants liked the music more when it matched their sad emotions. This observed mood-music congruency effect demonstrated how mood and music interact. Therefore, the congruence between the variables may be important with respect to creative ability.

There is a possibility that the combined effect of mood and music could influence creativity. Furthermore, this combined effect could be dependent on whether the particular conditions of these variables match. According to Adaman and Blaney (1995), happy or sad moods compared to neutral moods contributed to enhanced creativity. The congruency of mood and music in this study could have been the cause of the observed increase in creativity because there were no incongruent groups to use for comparison. Because Adaman and Blaney's study (1995) may have confounded the variables of mood and music, it is unknown whether the heightened levels of creativity were the result of mood, music, or the interaction between these two factors. We sought to investigate and resolve this confound by separating mood and music into two variables, initially manipulating mood, and then measuring creativity while music is playing simultaneously in the background.

The present study had two independent variables: mood (happy and sad) and music (happy and sad). We sought to induce the participants' moods to happy or sad by showing each person one of two video clips. After the mood manipulation, we utilized classical music that was congruent or incongruent with the currently induced moods. The music was played in the background while the participants completed a divergent thinking task. Based on the affect-congruency theory (Hunter et al., 2011), we hypothesized that people in the congruent mood and music conditions would obtain higher scores on the divergent thinking task than those people in incongruent mood and music conditions.

Method

Participants

A total of 72 undergraduate students from a small liberal arts college in Virginia participated in this

IRB-approved study. All candidates had to be at least 18 years of age. Of the experimental conditions, there were 17 participants in the happy mood/happy music condition, 17 participants in the sad/sad condition, 20 participants in the happy/sad condition, and 18 participants in the sad/happy condition. Two participants' data were dropped from the sad mood/sad music condition because of a printing error, and another two participants from the happy mood/happy music condition were not included because they failed to complete the manipulation check. Once the data were discarded, there were 31 men and 37 women between the ages of 18 and 39 (M = 18.99, SD = 2.67). In terms of ethnicity/race, 73.5 % of the sample classified themselves as White, 7.4% were Black, 5.9% Hispanic, 5.9% Asian, and 7.4% Multiracial/Other. All of the participants were recruited from the General Psychology classes, and they signed up for the study through an online psychology database.

Design

The present study was a between subjects experimental design. The levels of the first independent variable, mood induction, were happy and sad. The levels of the second independent variable, mood of music, were happy and sad as well. As a result, there were four conditions: induced happy mood/happy music, induced sad mood/sad music, induced happy mood/sad music, and induced sad mood/happy music. The dependent variable was the fluency, or total number of responses given by the participant on a divergent thinking task (Benedek et al., 2012; Bonk, n.d.).

Materials

We used two video clips for the initial mood induction. One video clip, the fake orgasm scene from *When Harry Met Sally* (45 min, 53 s–47 min, 28 s) was operationally defined as happy (Scheinman & Reiner, 1989). This clip has been empirically validated to induce happiness (Gross & Levenson, 1995). The other video clip, the funeral scene from *My Girl* (81 min, 0 s–82 min, 23 s), was operationally defined as sad (Grazer & Zieff, 1991). The clip from *My Girl* was used to induce a sad mood because it was similar to the empirically validated clip from *The Champ* (Gross & Levenson, 1995). However, the scene from *My Girl* was more relevant to our sample demographics' generation. We ran a pilot study in order to validate the clip's effectiveness. After close examination, we found that the majority of participants consistently gave higher ratings of sadness compared to any other emotion.

The operationally defined sad music was Tchaikovsky's Symphony No. 6 in B minor, Op. 74, "Pathetique" IV. Finale: Adagio lamentoso (10 min, 23 s) because of its minor mode and slow tempo. The operationally defined happy music was Tchaikovsky's Symphony No. 6 in B minor, Op. 74, "Pathetique" III. Allegro molto vivace (8 min, 42 s) because of its major mode and fast tempo (Tchaikovsky, 1893). These operational definitions were based on similar ones used by Hunter et al. (2011). Both pieces of music were accessed through naxos.com from the university library online database.

Mood or emotional states survey. The Mood or Emotional States survey functioned as a manipulation check after the mood-induction stage and consisted of four sections: questions about present moods, musical experience, musical preference, and demographic information. The first component was partially adapted from the Assessment of Emotion Measure (Lambert et al., 2010a), an internally reliable scale that had an alpha level of .87. In this measure, there were 25 different adjectives capturing happy, sad, angry, anxious, and neutral moods. Participants indicated how much they felt these emotions on a Likert scale ranging from 0 (*not at all*) to 5 (*very much*). However, due to the fact that we altered the scale slightly from the Assessment of Emotion Measure (Lambert et al., 2010a) in the current study, our redesigned survey had an alpha level of .17. Specifically, we reduced the list of adjectives to eight (*happy, tense, sad, content, nervous, bored, gloomy*, and *annoyed*) and focused only on the happy and sad emotions during data analysis. Also, we changed the Likert scale to range from 1 (*not at all*) to 5 (*very much*). These modifications may explain the discrepancy between the alpha levels of the original scale and our sample.

Divergent thinking task. Our divergent thinking task was modeled after Guilford's Alternative Uses Task (Benedek et al., 2012; Bonk, n.d.). This assessment has been used in conjunction with other similar divergent thinking tasks in a variety of studies (Chermahini, Hickendorff, & Hommel, 2012; Drapeau & DeBrule, 2013). It was intended to measure the participants' creative ability with respect to original thought. Specifically, our participants were asked to think of both conventional and unconventional uses for five provided objects: a brick, a cardboard box, a straw, a piece

of string, and a napkin.

Procedure

After volunteering to take part in the study, participants were randomly assigned to one of the four conditions: happy mood/happy music, sad/sad, happy/sad, or sad/happy. Before beginning the experiment, we ensured that everyone gave his or her informed consent. In a group setting dependent on their condition placement, participants then viewed a happy or sad video clip from *When Harry Met Sally* or *My Girl*, respectively. These clips were played at a medium volume and were viewed from a screen in the front of the classroom. While the participants watched the clip, the lights in the room were turned off, but the lights were restored after the clips finished playing. In order to confirm that the given clips actually influenced mood, the participants were then asked to complete the Mood or Emotional States survey individually (Lambert et al., 2010b). The participants took about five minutes to fill out the questionnaire.

Next, the participants individually completed a version of Guilford's Alternative Uses Task (Benedek et al., 2012; Bonk, n.d.) while listening to classical music for 11 min. This time was chosen because of the length of the musical selections. We wanted to make sure that all of the participants were exposed to the music for the entire testing time. Like the video clips, the music was regulated to a medium volume and remained so in all conditions. After the elapsed time, the papers were collected, and the participants were debriefed. All participants received credit in their psychology course for their involvement.

Results

To score the Mood or Emotional States survey, we subtracted each participant's self-reported sad rating from each happy rating. The resulting data produced a spectrum of emotion with a value of -4 being the *saddest* and 4 being the *happiest*. This scoring system indicated where each participant fell on the spectrum, rather than a classification as happy or sad. In order to check the validity of the mood manipulation, we conducted a one-way between subjects ANOVA with the independent variable of expected induced mood (happy or sad) and the dependent variable of self-reported mood rating. The difference between groups was significant, $F(1, 66) = 63.84$, $p = .001$, $R^2 = .49$. Using the aforementioned spectrum ranging from sad to happy, we concluded that the people in the induced sad mood were sadder ($M = -0.94$, $SD = 2.37$), and the people in the induced happy mood were happier ($M = 2.57$, $SD = 1.04$).

Mean fluency was analyzed using a 2 (mood) x 2 (music) between subjects ANOVA. Fluency was defined as the total number of responses given. The means and standard deviations for fluency scores are displayed in Table 1. The results revealed that the main effect of mood induction was not significant, $F(1, 64) = 1.90$, $p = .173$, $R^2 = .03$, implying that mood induction alone had no significant effect on the fluency scores. The main effect of the mood of music was also not significant, $F(1, 64) = .51$, $p = .477$, $R^2 = .01$. The mood of the music alone had no significant effect on the fluency scores. However, there was a significant interaction between induced mood and mood of music, $F(1, 64) = 5.15$, $p = .027$, $R^2 = .07$. In other words, creativity was influenced by both mood and music.

To follow up on the significant interaction for fluency, we conducted two simple effects to determine which of the four groups gave significantly more responses than the others. While the pattern of means (see Table 1) suggests that the congruent conditions demonstrated the highest fluency followed by the incongruent conditions, an analysis of simple effects revealed that this conclusion is not completely accurate. A simple effect of fluency for people in the induced happy mood group was not significant. In either the congruent or incongruent condition, happy participants did not give significantly more or fewer responses on the task, $F(1, 64) = 1.26$, $p > .05$, $R^2 = .02$. However, a simple effect of fluency for people in the induced sad mood was significant, $F(1, 64) = 4.34$, $p < .05$, $R^2 = .06$. Specifically, people in the induced sad mood gave significantly more responses on the divergent thinking task when they listened to sad music ($M = 25.27$, $SD = 11.00$) than when they listened to happy music ($M = 18.67$, $SD = 7.66$).

Discussion

The goal of this study was to determine whether mood, music, or an interaction between these two

TABLE 1

Means (*SD*) for the Fluency Scores on the Divergent Thinking Task

	Happy Mood		Sad Mood	
Mood of Music	*n*	*M* (*SD*)	*n*	*M* (*SD*)
Happy Music	15	26.73 (7.90)	18	18.67 (7.66)
Sad Music	20	23.30 (9.39)	15	25.27 (11.00)

variables had an impact on creativity. Participants viewed clips to induce happiness or sadness and then completed a divergent thinking task while listening to either happy or sad music. Because the video clips induced certain moods, a manipulation check was needed to make sure that the participants were actually happy or sad. The results from the mood questionnaire indicated that the manipulation of mood was successful. In general, people who were shown a happy video clip were happy, and people who were exposed to a sad video clip were relatively sad. We originally hypothesized that the participants in the congruent happy and sad conditions would exhibit higher levels of divergent thinking as opposed to those people in the incongruent conditions. This prediction was only partially supported. People in the congruent conditions gave more responses on the divergent thinking task, and those in the incongruent sad mood condition gave fewer responses. The finding of high fluency in the happy music/sad mood group was not expected.

The current study helped to clarify why Adaman and Blaney (1995) found that those in either an induced sad or happy mood scored higher on a creativity task than those in a neutral mood. Their study involved mood manipulation and utilized music to induce mood, so it is unclear what actually influenced the change in disposition. The researchers confounded mood and music, so the present study involved the separation of the two variables. To do this, we used video clips to alter mood and made music a secondary variable that was used to investigate the impact of congruence. From these changes, researchers might now understand more directly the influences of creative thinking. Taking the results of the current study into consideration, it is possible that Adaman and Blaney's (1995) results were due to an unintentional interaction between mood and music rather than just a straightforward mood induction.

These findings are consistent with the literature on mood congruency in that there was a significant interaction between mood induction and music for the fluency component (Adaman & Blaney, 1995; Hunter et al., 2011). Specifically, participants in the induced sad mood condition who then listened to happy music had significantly lower fluency scores than the other three conditions, whose fluency scores were not significantly different. Therefore, this finding suggests that congruence between mood and music was extremely important in terms of the total number of responses. Even more so, this result is supportive of the theory of mood-congruency, which emphasizes the importance of congruent mood and stimuli. The effect is especially prominent when people are in a sad mood, as those in a sad mood show a preference for sad music, and those in a happy mood do not show a preference for happy, sad, or neutral music (Hunter et al., 2011). The results suggest that people in the induced sad mood may have manifested their emotional connection to sad music through their strong performance on the divergent thinking task. On the other hand, those people in the induced happy mood showed no significant difference in the fluency of their responses, so happier moods do not necessarily coincide with greater emotional investment.

One drawback of the current study is the deliberate exclusion of a third level of neutral mood and music for the sake of convenience. Adaman and Blaney (1995) used a neutral condition as a baseline to compare the happy and sad conditions. This inclusion necessitated the addition of three more conditions: neutral mood/neutral music, neutral mood/happy music, and neutral mood/sad music. If we were to include this additional level, we would need to incorporate these three extra groups in order to maintain consistency. Because our study was conducted as part of a semester-long project, these extra conditions would have complicated our research and required more time and a larger sample size. Also, we found it difficult to define neutrality because the term is considered highly subjective. A neutral video clip would have no elements that would make a viewer happy or sad. A neutral piece of music would need to have neither a major nor minor mode and would not favor a fast or slow tempo. However, the inclusion of a control group with neutral conditions would have made it easier to distinguish between effects due to mood and/or music or effects due to individual error or bias. In general, a control group would have decreased the likelihood of overestimating the effects of a treatment.

For the divergent thinking task, people could use all four scoring components to interpret the data: fluency, originality, elaboration, and flexibility (Benedek et al., 2012; Bonk, n.d.). Originality refers to responses given by less than five percent of individuals. Elaboration is defined as the extent of explanation in a response, and flexibility is the amount of variability in a person's individual set of responses. Although we could analyze all

components using our data, it is difficult to do so because the participants' responses do not adequately address all four of the components of the divergent thinking task. The three additional constructs of originality, elaboration, and flexibility would provide a wider definition of divergent thinking and, in turn, enhance the findings.

It is not uncommon for strong emotions to evoke highly meaningful artistic work, as individuals may look for ways to channel their intense emotions (Adaman & Blaney, 1995). Although they are rarities, some exceptional authors, artists, and composers suffered from psychological conditions like bipolar disorder and depression, causing them to feel intense happiness or sadness. Kneller (1965) noted that creativity was historically viewed as a mark of mental instability, so the ability to think creatively may stem from various neuroses. Freud considered creative ability to be a cathartic response to inner turmoil (Kneller, 1965). Although there have been studies that have focused on creativity and/or divergent thinking, researchers have not yet looked at the combined effect of mood and music on creative ability without mixing the two variables. The significant results of the current study indicate the importance of congruence, especially for people in sad moods. Furthermore, this investigation has revealed that certain moods and types of music seem to inspire people to be more inventive in their thought processes. Because creativity is a necessary quality for professions in the arts and sciences, it is important to understand when a person is most or least creative. Many people listen to music for inspiration, and this study has shown that mood and music seem to influence the quality of creative thinking. When people need to channel their creative abilities, they should consider their moods and music.

References

Adaman, J. E., & Blaney, P. H. (1995). The effects of musical mood induction on creativity. *Journal of Creative Behavior, 29*, 95–108. doi: 10.1002/j.2162-6057.1995.tb00739.x

Beaty, R. E., & Silvia, P. J. (2012). Why do I get more creative across time? An executive interpretation of the serial order effect in divergent thinking tasks. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 309–319. doi: 10.1037/a0029171

Benedek, M., Könen, T., & Neubauer, A. C. (2012). Associative abilities underlying creativity. *Psychology of Aesthetics, Creativity and the Arts, 6*, 273–281. doi: 10.1037/a0027059

Bonk, C. J. (n.d.). *Guilford's alternative uses task*. Retrieved from http://www.indiana.edu/~bobweb/r546/modules/creativity/creativity_tests/guilford_uses_task.html

Chermahini, S. A., Hickendroff, M., & Hommel, B. (2012). Development and validity of a Dutch version of Remote Associates Task: An item-response theory approach. *Thinking Skills and Creativity, 7*, 177–186. doi: 10.1016/j.tsc.2012.02.003

Drapeau, C.W., & DeBrule, D.S. (2013). The relationship of hypomania, creativity, and suicidal ideation in undergraduates. *Creativity Research Journal, 25*, 75–79. doi: 10.1080/10400419.2013.752231

Grazer, B. (Producer), & Zieff, H. (Director). (1991). *My Girl* [Motion picture]. United States: Imagine Entertainment.

Gross, J. J., & Levenson, R. W. (1995). Emotion elicitation using films. *Cognition and Emotion, 9*, 87–08. doi: 10.1080/02699939508408966

Hetland, L. (2000). Listening to music enhances spatial-temporal reasoning: Evidence for the Mozart effect. *Journal of Aesthetic Education, 34*, 105–148. doi: 10.2307/3333640

Hunter, P. G., Schellenberg, E. G., & Griffith, A. T. (2011). Misery loves company: Mood-congruent emotional responding to music. *Emotion, 11*, 1068–1072. doi: 10.1037/a0023749

Isen, A. I., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem-solving. *Journal of Personality and Social Psychology, 52*, 1122–1131. doi: 10.1037/0022-3514.52.6.1122

Jones, M. H., & Estell, D. B. (2007). Exploring the Mozart effect among high school students. *Psychology of Aesthetics, Creativity, and the Arts, 1*, 219–224. doi: 10.1037/1931=3896.1.1419

Kneller, G. F. (1965). *The art and science of creativity*. New York, NY: Holt, Rinehart, and Winston, Inc.

Lambert, A. L., Scherer, L. D., Schott, J. P., Olson, K. R., Andrews, R. K., O'Brien, T. C., Zisser, A. R. (2010a). Rally effects, threat, and attitude change: An integrative approach to understanding the role of emotion. *Journal of Personality and Social Psychology, 98*, 886–903. doi: 10.1037/a0019086

Lambert, A. L., Scherer, L. D., Schott, J. P., Olson, K. R., Andrews, R. K., O'Brien, T. C., Zisser, A. R. (2010b). *Assessment of emotion measure* [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t02954-000

Pietschnig, J., Voracek, M., & Formann, A. K. (2010). Mozart effect-Shmozart effect: A meta-analysis. *Intelligence, 38*, 314–323. doi: 10.1016/j.intell.2010.03.001

Scheinman, A., (Producer), & Reiner, R. (Director). (1989). *When Harry Met Sally* [Motion picture]. United States: Castle Rock Entertainment.

Tchaikovsky, P.I. (1893a). Symphony No. 6 in B minor, Op. 74, *"Pathetique"* IV. Finale: Adagio lamentoso [Recorded by Philadelphia Orchestra]. On [CD]. Philadelphia, PA: EMI Classics. (1992). Retrieved from http://umw.naxosmusiclibrary.com.ezproxy.umw.edu:2048/playlists/playlisttrack.asp?tbg=usr&pid=205640

Tchaikovsky, P. I. (1893b). Symphony No. 6 in B minor, Op. 74, *"Pathetique"* III. Allegro molto vivace [Recorded by Philadelphia Orchestra]. On [CD]. Philadelphia, PA: EMI Classics. (1992). Retrieved from http://umw.naxosmusiclibrary.com.ezproxy.umw.edu:2048/playlists/playlisttrack.asp?tbg=usr&pid=205640

Vuoskoski, J. K., & Eerola, T. (2012). Can sad music really make you sad? Indirect measures of affective states induced by music and autobiographical memories. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 203–213. doi: 10.1037/a0026937

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